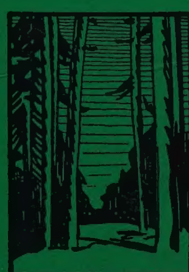
J. Nelson Spaeth

JOURNAL *of* FORESTRY



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JOURNAL OF FORESTRY

VOL. XXXII OCTOBER, 1934 No. 7

The Society is not responsible, as a body, for the facts and opinions advanced in the papers published by it. Editorials are by the Editor-in-Chief unless otherwise indicated and do not necessarily represent the opinion of the Society as a whole. The "leaders" preceding major articles are to be regarded as editorial additions.

EDITORIAL

PROFESSIONAL IDEALISM

IN this issue of the JOURNAL appears a petition signed by twelve members of the Society in which it is charged that the editorial policy of the JOURNAL during the last few years no longer represents the broad social ideals of the founders of the Society, that the vital problems of forestry are overlooked or discussed not from a social standpoint or in the spirit of the New Deal, that young men earnestly seeking positive leadership do not find it in the JOURNAL, that it lacks the spirit of social leadership which once was a distinguishing characteristic of the profession and that dissatisfaction with its policy is prevalent among many members of the profession.

One of the signers states "It (the Society) allowed itself to get into the hands of the lumbermen, it permitted itself to adopt and exercise a code of ethics which made profit for the lumbermen more important than the public interest, and it ceased entirely to be as it was in the beginning, the effective leader of forestry in the interest of the whole people of the United States." The petition itself says, "we should prefer not to go into specific instances where the editorial policy of the JOURNAL has been prejudicial to the best interests of the Society."

I can fully sympathize with the ideals and aspirations of this group, and can claim to be at one with them in a record of unremitting efforts to advance the public, economic and social ideals of forestry. I am equally enthusiastic with them for the success of an enlarged program of national forests, the strengthening and expansion of state forestry departments, the control of erosion on the public domain and elsewhere, the retirement of submarginal farm lands, the proper functioning of the C.C.C. and last but not least, the practice of forestry on private lands under Article X of the Lumber Code. It is my hope and desire that the Society shall function to the full measure of its power in furthering all the progressive measures of the present magnificent effort towards a better civilization and a more hopeful future.

Because of this temperament I could easily let myself go the full length in vigorous espousal of these projects, and have at times done so. But a blend of New England Yankee and Pennsylvania Dutch has exercised a restraining influence and turned my attention to the practical means of accomplishment, and the necessity of considering actual conditions and facts in building the structure. For

example, I attended a small conference in 1909 at Doucette, Texas, at which measures now crystallized in the Lumbermen's Code were perhaps for the first time discussed by John L. Kaul of Alabama and Gifford Pinchot. The proposal by Mr. Kaul was that in return for authority to control prices, 50c per thousand should be set aside for the practice of forestry on lumber holdings. My contribution was to the effect that knowledge of proper silviculture was lacking, and that the private owners should at once begin experimental operations in order to accumulate the facts on which to base their practice. To my surprise, this suggestion was vetoed as tending merely to delay the general adoption of the forestry program. Nevertheless, this is what actually occurred, and during the 25 years which elapsed before the Code was adopted, much of the vitally necessary information was secured, largely, however, by public agencies. Upon this rock, and this alone, can any success be anticipated in the application of Article X in the woods.

Likewise I have been sorely tempted on numerous occasions to fulminate against the wicked and senseless neglect of elementary measures for preserving the productiveness of forest lands when as an observer and student of the possibilities of such forestry I could foresee only too clearly the otherwise progressive deterioration of the resource. But the desire to face actual conditions has as often turned aside these polemics and led instead to efforts to secure expansion of public forests, extension of fire protection and last but not least, better systems of taxation for forest property, in the belief that by creating more favorable conditions and only in such ways could private forest practice be made possible.

I regard the adoption of Article X of the Lumber Code as the greatest *potential* achievement in American forestry, and if the Society and its secretary contributed their aid and services to this task, it is an outstanding example of sane, progressive and constructive leadership. To regard it differently would go far to justify criticisms frequently made by individuals in the lumber industry, reflecting on the wisdom and practical ability of foresters, when dealing with economics. The profession and the Society are committed to coöperation with private forest owners on the assumption of good faith of all concerned, and will turn a deaf ear to further sweeping and unsupported statements to the contrary.

A second illustration of the need for consideration of this practical means to the achievement of our objectives arises when the question of public service comes up. The expansion of forestry under the New Deal throws a terrific weight of responsibility upon federal departments and services. The issue here goes to the roots of democracy. If public activities either regulatory or direct are to succeed, in the management of economic and technical operations large or small, it can only be through the retention and development of nonpolitical technical services of experts on a Civil Service basis. Yet we find exactly the opposite principle urged in high and unexpected quarters, to the effect that the support of the President's program demands "loyalty to the party" above all other considerations. Is it demanded that the Society through its editorial columns cease its agitation for restoration of public service as an honorable professional career and are these the editorials alluded to in the phrase "the JOURNAL is lost in petty quibbling over inconsequential matters, and artificially created issues"? And would the editor be guilty of perversion of the broad social ideals of the founders of the Society if he should wish to know more about the prospects of permanent success of the recent $75,000,000 tree planting program on the western treeless plains, or express apprehension over the terrific drive for patronage and spoils which threatens al-

ready to inundate this project with a flood of political appointees?

To a question "How long should a man's legs be," Abraham Lincoln once replied: "They should be long enough to reach the ground." A friend of the writer's in conversation recently remarked, "If I wanted to go out and loot a project, I should hitch my wagon to a bunch of impractical idealists." The distinction between professional idealism and impractical idealism is expressed in the above two quotations. The professional idealist (not one who makes idealism a profession, but one who is both an idealist and a professionally trained man) will possess all the innate caution and fidelity to facts of an engineer, combined with imagination and initiative, which is the more effective when exercised along sound lines. He will disregard neither existing conditions nor the opinions of others. While recognizing the existence of crookedness, hypocrisy and venality in individuals he will refrain from condemning those of opposite opinions as being automatically guilty of such crimes.

If this should be the attitude of a professional idealist it should also be that of the Society as reflected in its editorial policy. Professor Milliken in the New York *Times* of August 7th emphasized afresh the age old struggle of the human species towards civilization and significantly chose the issue of freedom of speech and of criticism as the keynote of progress. *This is a hard lesson for idealists and one not always learned.* Unless tempered by professional saneness and wisdom the enthusiast inevitably seeks to suppress adverse criticism, in the achievement of the goals in which he so sincerely believes. But by this route comes first, autocracy, next, despotism and the paralysis of initiative, and finally, the breakdown of the very measures for which liberty has been sacrificed.

To me, the issue is clear. The Society and the JOURNAL, while bending every effort towards the greatest possible realization of every promising means to advance public interest in forestry measures, must welcome at all times the utmost frankness of criticism of the very measures which we regard the most important. Under the present editor this has been its policy. While the present Council remains in office, it will continue to support this policy.

H. H. CHAPMAN.

RICHARD THORNTON FISHER

By RALPH S. HOSMER

Professor of Forestry, Cornell University

THE sudden death of Richard Thornton Fisher, Director of the Harvard Forest, on June 9, 1934, took from the ranks of forestry a man who had made significant contributions to its advancement in America. As teacher, investigator, and manager of a forest where the primary purpose is to demonstrate that forest management can be carried on for profit, Fisher built up a reputation which brought him well deserved recognition. His name will ever be indissolubly joined with that of the Harvard Forest, for he made it the unique institution for forest research that it is today.

Because of his striking traits of character he was liked and respected by all who knew him. By those who were privileged to closer intimacy, and so came under the charm of his personality, "Dick" Fisher will be vividly remembered.

To all his friends his death came as a grievous shock. For him it was a beautiful way to go. While playing golf,—his favorite pastime,—with a friend in Canton, near his home in Weston, Mass., he was stricken with an attack of a disease of the heart. He died within a couple of hours. His funeral was held in the Unitarian Church in Petersham, where the casket was completely covered by a great mound of mountain laurel, one of his favorite flowers, gathered near the Harvard Forest.

Richard Thornton Fisher was born November 9, 1876, in Brooklyn, N. Y. He was the son of Edward Thornton Fisher and Ellen Bowditch (Thayer) Fisher. He had two sisters. He was prepared for college at the Harvard School in Chicago, Ill. In 1898 he was graduated with the degree of A.B. from Harvard University. That summer he served in the west as a field collector in the Biological Survey of the U. S. Department of Agriculture. For the college year 1898-99 he was Assistant in English in Harvard College, under the well known teacher Professor Barrett Wendell. From 1899 to 1903 he was employed in the Division, later the Bureau of Forestry, now the Forest Service, of the U. S. Department of Agriculture, first as student assistant, then as agent, and finally as field assistant.

Fisher was thus one of those early in the field in forestry in the United States; a member of the closely knit group of men who helped Gifford Pinchot get the practice of forestry under way. Two bulletins in the "old series" of the Bureau of Forestry bear his name: No. 38, "The Redwood," the first careful study of that important tree, and No. 42, "The Woodlot." Of the latter he was co-author with H. S. Graves. Both were published in 1903. While on furlough in 1901-02 Fisher joined the first class at the Yale Forest School, receiving his M.F. as of that class, although the degree was actually conferred in 1903.

In 1929 Yale granted to him the honorary degree Master of Science in recognition of "enduring achievement." He became a member of the Society of American Foresters in 1903 and in 1925 he was elected a Fellow because of the outstanding merit of his work on the Harvard Forest. He was a member of the Ecological Society of America, of the

American Association for the Advancement of Science, and of the American Academy of Arts and Sciences.

In 1903 he visited and studied in the forests of Germany. Then, after another short period in the Bureau of Forestry, he was chosen by President Eliot to organize the School of Forestry at Harvard. From 1903 to 1905 he was Instructor in Forestry; from 1905 to 1920 Assistant Professor of Forestry; and from 1921 to 1924 Assistant Professor of Forestry and Lumbering. He was a member of the Faculty of the Bussey Institution from 1913 to 1931, of that of the Graduate School of Arts and Sciences, Division of Biology, from 1931 to 1934, and of that of the Graduate School of Business Administration from 1914 to 1924. He became Head of the Harvard Forest in 1907, when the Division of Forestry, of which he was the Chairman, was reorganized on a strictly graduate basis. From 1915 he held the title Director of the Harvard Forest.

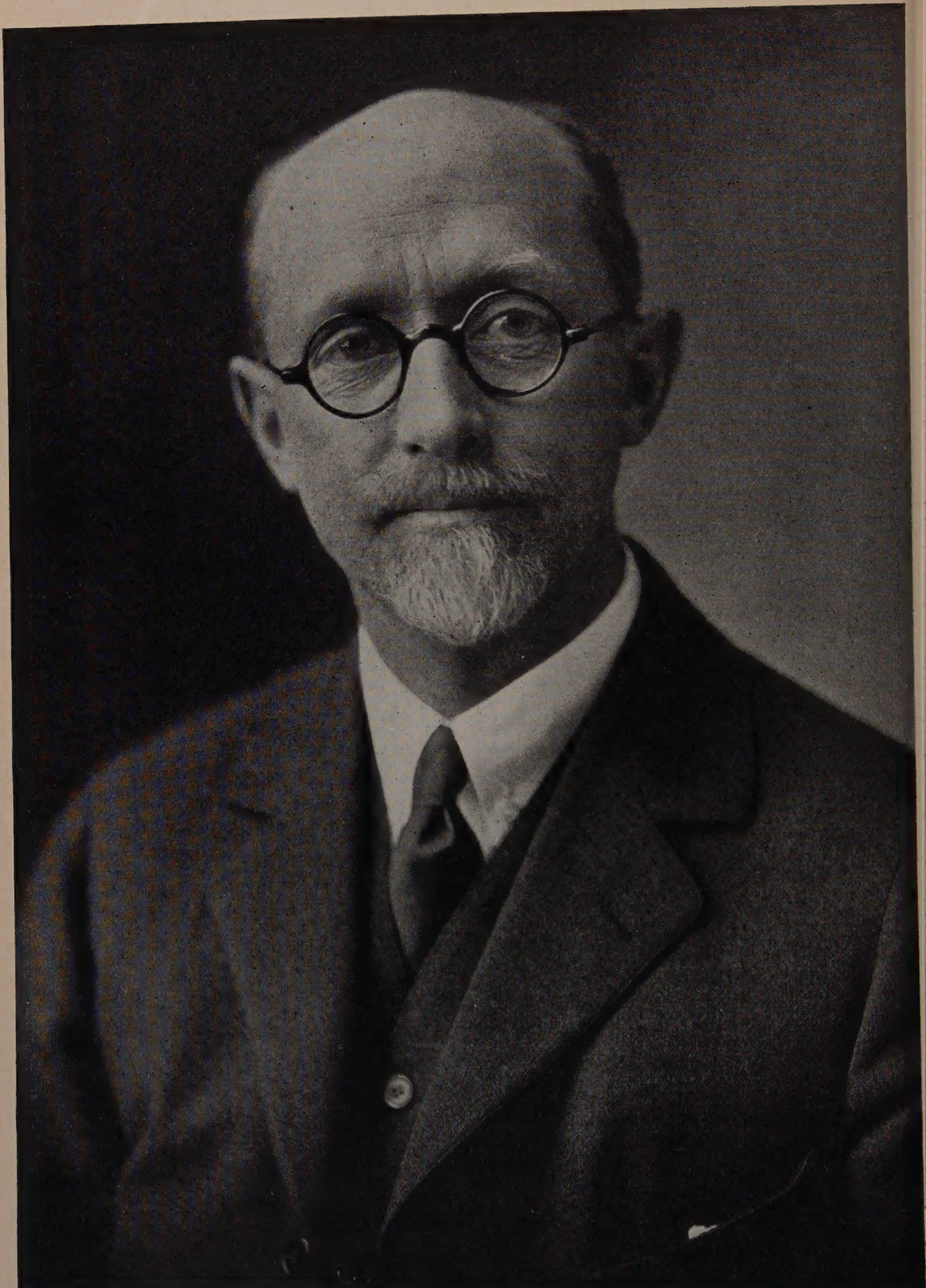
Coincident with the reorganization in 1907 occurred the gift to the University of the tract of a little over 2,200 acres in Petersham, Mass., some 60 miles from Boston, since known as the Harvard Forest. In its management Fisher had these three objects in view: to build up and maintain (1) a model forest to demonstrate the practice of forestry; (2) an experiment station for research in forestry; and (3) a field laboratory for students of research in forestry. To bring these things to pass was the task which Fisher set for himself as Director. Their accomplishment is his enduring memorial.

This is not the place to enlarge on what has taken place on the Harvard Forest, but it is in point to mention the long series of bulletins which record the results of the silvicultural and economic studies made under the guidance and supervision of the Director. With characteristic modesty Fisher permitted his associates to have the credit for these publications. Bulletin No. 1, issued in 1921, "The Management of the Harvard Forest, 1909-1919" is the only one of the series which bears his name as author. But that the various and diverse activities of the Forest were under his personal supervision is well known. It may also be noted that over ninety men, working under him, have received from Harvard advanced degrees for studies in forestry.

The results achieved are due in very large part to the quiet but contagious enthusiasm, the will persistently to follow an ideal, and by no means least, the practical level headedness of the Director. In his keen interest in the scientific aspects of his work, and in the training of graduate students, he never lost sight of the economic considerations in forest management. As a research worker Fisher was by no means a prolific writer, but when he did publish contributions in the JOURNAL OF FORESTRY or elsewhere, they were sure to command attention. A number of such articles are enumerated in the Cumulated Index of the publications of the Society.

Fisher's interests were, however, not confined to the Harvard Forest. He was actively associated with projects of the Massachusetts Forest and Park Association, particularly in connection with the setting up of the Massachusetts Forest Taxation Law of 1922 and the establishment of town forests. He was always ready to coöperate with the offices of the Massachusetts State Forester and of the Metropolitan Water Supply Commission of Massachusetts, and with the Society for the Protection of New Hampshire Forests.

He maintained close and cordial relations with the forest industries in his neighborhood, and indeed throughout New England. He was often called in as advisor by those representing these groups, as well as by the owners of



Richard Thornton Fisher
1876-1934

estates near Petersham and of smaller woodlands elswhere in Massachusetts. He took his part in local civic affairs, serving for many years as Tree Warden of Petersham and being active in the local Improvement Society and in the Country Club. He was influential in the New England Section of the Society of American Foresters. Had he so desired he would have been much more in the public eye, but it was ever his way to shun publicity while working earnestly to bring about desired ends.

For some years, from 1907, Fisher was associated with the firm of consulting foresters in Boston made up with himself of Austin Cary, E. S. Bryant and later, for a time, Frederick E. Olmstead.

In July, 1913, he married Miss Georgina Paine, a daughter of Charles J. and Julia (Bryant) Paine, of Weston, Mass. They had five children, three sons and two daughters. The eldest of the sons is R. T. Fisher, Jr. Mrs. Fisher and the children all survive him. The Fishers divided the year between their two homes, in Weston, near Boston, and in Petersham.

The work which Fisher did on the Harvard Forest will continue to influence forestry in America for many decades. His approach in attacking both silvicultural and economic problems will remain an incentive to stimulate other workers to renewed effort. He will be remembered as an outstanding forester in whom were combined the qualities of an excellent teacher, unusual powers of keen observation, love of beauty, sound and practical business ability, and a personality which endeared him to those who knew him well. Forestry in America has been enriched by his work and his life.

FOREST EDUCATION BEFORE 1898

By HERBERT A. SMITH

U. S. Forest Service

Even though our profession in America is comparatively youthful, as professions go, nevertheless it has already attained that age where its early pioneers are successively passing off the stage with increasing frequency. Most of them throughout their actively productive careers have been so busy doing things that they have not taken the time to leave behind them a detailed record of what they did and how they went about doing it. Such a historical record is of inestimable value to those of us coming after, as a background from which to plan and carry on into the future. We are indebted therefore to Herbert Smith for the time and effort he has put into this conscientiously accurate account of the early beginnings of forest education.

When Fernow, at the age of thirty-five (he had come to the United States when twenty-five) assumed charge of the Division of Forestry in 1886, he felt that a turning-point had been reached. For ten years his predecessors, not trained foresters, had been engaged in carrying out the purposes of Congress as expressed in the act of 1876. "The Forestry Division," he said in his first annual report, "was originally intended to furnish data upon which a true conception might be formed of the condition and importance of our forests and forest supplies, and by presenting the methods of management pursued in other countries to aid the legislator in formulating a forest policy for this country. This work, mainly of statistical or historical character, so far as general information goes may be deemed concluded." His own undertaking was to be "establishing the methods upon which forest planting and forest management can be carried on in our country with our native timber trees"—in other words, to build up an adequate scientific foundation for American forestry practice.

With this in view his mind turned to laying out a schematic framework for directing and coordinating investigations. His 1886 report contained a general outline for commercial-tree studies, which he planned to carry through first for the leading species of conifers, eastern and western. "The monographs on the white pine by Prof. S. V. Spalding, Ann Arbor, Mich.; on the long-leafed pine, by Dr. Charles Mohr, Mobile, Ala.; and on the bald cypress, by Prof. A. H. Curtiss, Jacksonville, Fla., have already been completed. It is proposed to take up gradually the other important conifers and deciduous trees." A year later his annual report contained a complete scheme of the subject-matter of forestry. Into this schematic framework Fernow fitted his accumulating material.

The framework, however, had also another purpose. Fernow believed that "by the presentation of such a systematic arrangement of the topics demanding the forester's attention, the educational advancement of the science in this country will be subserved, and students interested in forestry will find in it an aid to their studies . . . . "

The 1886 report had contained a brief section on "Instruction in Forestry." All that it said was, save for mention of the Michaux Fund lectures at the University of Pennsylvania:

"There are no schools of forestry in this country, nor are there regularly appointed chairs of forestry in any of the colleges or universities. In some of the agricultural colleges the professor of

botany has the title 'and forestry' added, but instruction, if given at all, is only incidental. . . . A conception that forestry is a distinct branch of economics and not identical with arboriculture, or simple tree planting, has not yet found entrance into our institutions of education."

But the following year's report gives a new aspect to the matter. Information as to the "condition of forestry interests in the States," gathered through "correspondence with the secretaries of State, of horticultural, and other societies, with professors of agricultural colleges, and other persons informed on the subject," had evidently afforded Fernow, for the first time, a full picture of what the colleges were doing in forestry education. Passing over for the moment the question of subject-matter, available material, and objectives, the number of institutions that had included forestry in their curricula is fairly impressive. Fernow names the New Hampshire, Massachusetts, Michigan, Missouri, and Iowa agricultural colleges; the New York State agricultural college at Cornell; the Universities of Pennsylvania and North Carolina; and Yale.

In the March, 1934, issue of the JOURNAL OF FORESTRY Professor Guise brought out that two courses of instruction in forestry were offered at the University of Michigan by Professor Spalding as early as 1881. This is not mentioned by Fernow. The discovery by Dana of the two University of Michigan courses given "in 1881-82 and 1882-83 and subsequent years" led Guise to correct the statement in Forest Education that "perhaps the first course in forestry, in the larger sense, given at an American institution was a series of lectures at the Massachusetts Agriculture College by Dr. B. E. Fernow in 1887." Guise thought it "highly probable that these two [Michigan] courses represent the first ones given at any of the colleges or universities in the United States." It seems, however, that both Yale and Cornell, at least, were earlier in the field.

Of the work done at Cornell Fernow's 1887 report said: " . . . a course in instruction in forestry was instituted in 1874, and has been regularly continued since that date." And of the work at Yale: " . . . since 1873 a few lectures on forestry and tree culture have been given each year to the students in the agricultural course."

Fernow brought forward another candidate for the primacy. "Iowa has been almost if not quite, the first of our states to engage in the teaching of practical forestry, instruction in that subject being given regularly in the agricultural college at Ames." And the Massachusetts Agricultural College course also seems to have been inaugurated before the courses at Michigan; for Hough's 1877 Report Upon Forestry records as having been adopted a recommendation made by the executive committee of that institution early in 1876 that "some instruction be given in forestry, both theoretically and practically." "The time is not far distant," continued the recommendation, "when every farmer in the country will, in his own interest, be obliged to give some attention to tree planting, and such a course as is here recommended will be of advantage to the students and to the State at large."

Fernow's Massachusetts Agricultural College Lecture Course

Before going further into the evidence gleaned by Fernow regarding forestry courses under way in 1887, the statement that he himself gave a course of lectures at the Massachusetts Agricultural College in that year requires consideration. For although it rests on Fernow's own statement in later years, it is apochryphal.

On page 433 of the first (1907) edi-

tion of his Brief History of Forestry Fernow said:

"Perhaps the first attempt to present systematically a whole course of technical forestry matter to a class of students was a series of twelve lectures, delivered by the writer, at the Massachusetts College of Agriculture in 1887."

In 1911 a revised and considerably enlarged edition carried the same assertion, word for word, but with an addition at the end, reading "and another to students of political economy at Wisconsin University in 1897." The lengthened sentence occurs on page 501, and reappears on the same page of the "third revised" (copyright 1913) edition, in identical form. This thrice-repeated statement makes it impossible to suppose that the lectures could have been misdated through some inadvertence or printer's error. But neither the Massachusetts Agricultural College records—as I am informed by Professor Holdsworth—nor the published contemporary records of Fernow's doings as Chief of the Division of Forestry afford any support for his statement. They do establish, however, that he gave a course of lectures systematically presenting technical forestry at Massachusetts Agricultural in 1894.

That the evidence against the 1887 date is purely negative and that Fernow's categorical statement outweighs it, is a natural first thought. But had Fernow delivered a course of lectures at the Massachusetts Agricultural College in 1887, it is incredible that mention of the fact would not have appeared in his annual report. Other travel is specified, but none in the direction of Amherst. Field travel was for Fernow unusual and notable enough to call for some account of it in his reports, if it was of much importance. Likewise, he summarized each year the educational and informational activities engaged in. The 1887 report specifies that these activities comprised "not less than ten addresses upon as many different aspects of the forestry question given before forestry and horticultural associations, state boards of agriculture and other societies, lectures delivered in various places, the writing of many letters on general and special questions, and of circulars of information, etc." But in the 1894 report Fernow said:

"Leave of absence was granted the writer for the purpose of delivering a course of twelve lectures on technical forestry before a class of 50 students at the Amherst Agricultural College."

In its issue of May 16, 1894, *Garden and Forest* has the following note (page 200):

"Mr. B. E. Fernow, Chief of the Division of Forestry of the Department of Agriculture, is delivering a course of lectures to about 50 members of the senior class of the Agricultural College at Amherst, Massachusetts. The subjects treated in these 12 lectures are "Timber Physics," "Silviculture," including "Artificial Afforestation" and "Natural Regeneration"; "Forest Protection" and "Forest Exploitation," "Forest Survey," "Forest Regulation" and "Forest Finance," "What is Forestry?", "How Trees Grow," "How Forests Grow," "Accretion and its Measurement," "The Battle of the Forest," and "Forestry Problems in the United States."

There is in the Forest Service library an undated syllabus, bearing no imprint, of "lectures introductory to the study of forestry, by B. E. Fernow, Chief of Division of Forestry, U. S. Department of Agriculture." The syllabus is for ten lectures, with titles the wording of which (though not the order and grouping) is precisely identical with the "subjects" specified in Garden and Forest, except for "The Battle of the Forest," and "Forestry Problems in the United States." It is certain that Fernow had a lecture on the first of these two subjects which he gave elsewhere, before general audiences; it seems reasonable to assume the same

of the second subject; and it can therefore be plausibly conjectured that the "twelve lectures on technical forestry" delivered at the Massachusetts Agricultural College in 1894 comprised the ten of the printed syllabus and two supplementary stock ones originally prepared for popular use.

There is also a direct tie-in of the syllabus with the 1887 schematic framework. To the syllabus of the first lecture is added a "System of Forestry Knowledge" which is manifestly a revision of the earlier system. The extent and character of the changes suggest a gradual reworking of the subject matter in Fernow's mind over a period of several years. And the most plausible explanation of the slip of memory which caused him years afterwards to antedate the delivery of the lectures would seem to be that he confused the initial drawing up of the scheme with its first use in connection with a comprehensive presentation of the subject-matter of forestry in lecture form. Hard though it is to understand how he could have fallen into such a mistake, the weight of the negative evidence against the 1887 date is so great as to be conclusive.

Character and Subject Matter of the Early Courses

Fernow's 1887 report outlines the character of the forestry course then offered by Cornell. Given every alternate year, it called for two lectures a week in the fall term and an equal amount of time in the spring term spent in studying "the forest flora of the region near the University." The "leading subjects covered in the recent lectures" were reported as comprising:

"Forests generally considered, and their relation to savage and civilized life; the native forests of the United States; effects of forest removal; relation of forests to climatic conditions in general; forest denudation in the United States; forestry in Europe and European forest schools; forestry in the United States; the Adirondacks and the proposed work of the state forestry commission; methods and practices in forestry."

This has many points of resemblance to the University of Michigan course given by Professor Spalding, as outlined in Guise's article in the March, 1934, Journal. Taking into account what was known and believed at the time, the Cornell and Michigan outlines together afford a good idea of the then available material from which to build forestry courses, anywhere. It was Fernow's task to supply and disseminate better material for forestry education; and his subsequent reports show how important a part of his work he conceived it to be to assume and maintain a helpful leadership of the teaching of forestry in colleges and universities throughout the country.

What that teaching was before he undertook to clarify its objectives and enrich its content is brought out further in the 1887 report. At the New Hampshire State College of Agriculture "forestry forms one of the regular studies . . . . with Doctor Hough's 'Elements of Forestry' as text-book." Details regarding the work at the Massachusetts Agricultural College were given through quoted portions of a letter from Professor S. T. Maynard. Besides "experiments in a small way" there was specified a course of study of "the principles of forestry; their importance, influence upon climate, temperature, rainfall, and the general welfare of other crops as affected by them." The students "are taught the various methods of propagation of forest and ornamental trees, the names and characteristics of all trees of value for forests or ornamental purposes, together with the insects injurious to them." At the University of Pennsylvania "under the Michaux fund . . . occasional lectures on

arboriculture and forestry are given from time to time"; at the University of North Carolina "a course of instruction . . . has been instituted by Prof. J. A. Holmes"; at the Michigan Agricultural College "the professor of botany has also the title of professor of forestry," and "a class of twenty-five seniors received lectures on forestry for twelve weeks, daily"; at the Missouri State College of Agriculture "a brief period . . . is given to teaching the laws of forestry."

Forest Experiment Stations Advocated

Unquestionably Fernow believed that the agricultural colleges opened large possibilities both for the teaching of forestry and for the building up of the scientific knowledge necessary for forestry. The Hatch act establishing experiment stations at all these colleges was passed in 1887. Hough in his 1882 report and Egleston's reports published in 1884 and 1885 had advocated the establishment of federal forest experiment stations, and Egleston had suggested their connection with state agricultural colleges; the 1887 law seemed to make the prospects in this field much brighter. It had been in Hough's mind when he first set forth the need for federal forest experiment stations that they should be made "the opportunity for the employment of young men who wished to acquire a practical knowledge of forest tree planting" and that when fully organized they would afford "the germs of schools of forestry." F. P. Baker in one of the sections of Egleston's 1884 report had argued vigorously for combined schools of forestry and forest experiment stations, to be established by the federal government. At that time state agricultural experiment stations were a novelty, Connecticut having provided the first one only in 1875; and until the Hatch act was passed it was perhaps anybody's guess whether ultimately a federal or a state system would emerge. Once that was decided, and the provision of the original Hatch act for including experiments in forestry incorporated in the legislation, the course seemed charted.

A Plan That Failed

By 1891 Fernow was receiving many calls from agricultural college and other professors "for text-books in forestry and for advice in arranging for lectures," and in response he devised and published a "scheme of 100 forestry lectures." But at about that time or soon afterward a new plan for forestry education in the United States took shape in Fernow's mind. The formulation of this plan was closely related to the epoch-making legislation of 1891, which inaugurated the federal forest reservation policy.

That legislation brought an instant shift in the immediate objectives of the forestry movement. Before very extensive exercise of the Presidential authority to reserve the public domain timberlands could be expected, means had to be devised for assuring their competent administration by foresters, and legislation had to be obtained providing a suitable basis for administration. Temporarily, the forward march toward the goal of permanent federal ownership of all the remaining federal forest lands chiefly valuable for forest purposes (the goal which Schurz, as Secretary of the Interior, had first set up in 1877) came almost to a halt while the conservationists busied themselves with the crucial question of how to get the locked-up reserves unlocked and utilized under forestry practices. The act of 1897 unlocked them; but it neither assured their administration by foresters nor gave any help toward answering the question where the foresters were to come from. On this Fernow had definite views. Earlier ideas which he had advanced looking to the supply of American-trained foresters for the work

of the government were discarded in favor of a plan which he set forth in "Forest Leaves" for February, 1895:

"It is proposed to introduce presently into Congress legislative measures providing for obligatory courses at the agricultural colleges, as well as courses of lectures at West Point, a post-graduate course at the Department of Agriculture, and scholarships for forestry students to be sent abroad."

Probably the inclusion of the West Point lectures was a concession to the pronounced feeling amongst many if not most of the forestry leaders at that time in favor of turning over the administration of the forest reserves to the army and adding forestry to the West Point curriculum. Professor Sargent was one of the strongest advocates of manning the forest reserves with a technical administrative force trained in this way; and he was able to make his views prevail in the recommendations of the committee appointed in 1896 by the National Academy of Sciences, upon the request of the Secretary of the Interior, to recommend a national policy of forestry in the United States.

The first and partial report of that committee, it will be recalled, was followed by the Cleveland proclamations of February 22, 1897, which virtually doubled the area of the forest reserves in a single day and nearly led to the overthrow by Congress of the whole reserve policy. The full report, which followed a few weeks later, contained recommendations for establishing a system of administration which to a considerable extent were utilized in drafting the Act of June 6, 1897—the magna charta of the national forests. Fortunately, however, Congress did not find acceptable the recommendations for making West Point a forestry as well as a military academy and making national-forest administration an army job. On the other hand, neither did Fernow's plan make headway; and his acceptance in 1898 of the call to develop a professional school of forestry at Cornell, followed by the opening of the Yale School of Forestry two years later, started technical forestry education in the United States on the path which it has ever since pursued.

ARE FORESTERS UNDERPAID?

By Henry E. Clepper

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Although foresters' salaries are less than those received in the fee professions, the author believes that foresters are not underpaid. He holds, however, that an oversupply of forest school graduates, which without regulation is certain to occur, will eventually result in lower compensation for practitioners. This article is intended to reopen the discussion of professional pay scales, temporarily sidetracked by the depression.

IDEALISM and altruism aside, every young professional worker has the right to know what he may expect in the way of income from his chosen profession. In fact, a person contemplating a profession is strangely lacking in curiosity who does not ask what the approximate initial salary is and what income he may expect in his prime.

It must be granted that forestry is a profession in which a belief in public service and the consequent necessity for a certain amount of sacrifice in salary have long influenced the attitude of foresters with respect to income expectations. Accordingly, among foresters there is a definite and widespread acceptance of the suggestion that their salaries, in common with ministers, teachers, and social workers, should be less than certain other professions, such as law and medicine. The source of this idea is not hard to find, for it is an historical fact that the early foresters were wholly imbued with the missionary spirit and salaries have ever since fallen into the missionary pattern. Consequently, there is an attitude in the profession that the forester should be content with less salary because service is his predominating motive.

Now, with very few exceptions, the satisfaction that the ordinary worker derives from his occupation is measured largely by his income. His contentment in his chosen work is further conditioned by the degree that his income compares favorably with the incomes of workers in other similar occupations, particularly those in the community in which he is located. For example, a forester or a physician living in an isolated rural community of three thousand population may consider himself amply blessed on a salary of $2,400, whereas in a large city, such as Washington, on the same salary he may be hard put to it to provide as comfortable a home, to enjoy as many recreational and educational advantages for himself and family, to dress as well, and otherwise live up to the standard of his neighbors and friends.

One of the saddest of human spectacles is the sight of the worker humiliated, and perhaps gradually becoming discouraged, because his income is less than other workers in similar positions with similar education and experience. On the other hand, an inferiority complex is avoided when a worker realizes that, having received less education and a shorter period of training and experience, he cannot in justice expect to receive as much as the man whose preparation for work has taken twice as long and cost twice as much.

Probably one of the most widespread of human desires is the itch to compare incomes. The tendency is evident in the forestry ranks. Graves and Guise in their *Forest Education* made a detailed analy- of the incomes of different members having different years of service. From this book foresters for the first time obtained a fair notion of what the members of the

profession as a whole were receiving in the way of salaries for various years of service.

As desirable as it is to know how salaries compare within a profession, it is perhaps even more interesting to be able to compare the incomes of one professional group with another. Through the recent publication of a book, *Compensation In The Professions* by Lester W. Bartlett and Mildred B. Neel, comparison between the salaries paid foresters and other professional groups can now be made.

The researches in compensation of Bartlett and Neel began about 1928. Graves' and Guise's studies covered about the same period. Roughly speaking, both groups of authors began their investigations during the period of great prosperity and continued them into the depression of the early 1930's. Accordingly, for purposes of comparison the two sets of figures lose none of their value, and the fact that they were obtained during a period of great economic and social change does not confuse the results obtained.

Perhaps the writer may be permitted to submit a few generalizations based both on his observations of foresters' reactions to the salary question and on the figures in the table. It may be argued that the comparisons in the table are more interesting than useful. These figures, it must be remembered, are based on income at the time the information was gathered and do not show the variations that we know followed the great fluctuations in economic conditions of the past five years.

(1) The fee professions (law, medicine, dentistry, and, to a limited extent, engineering) provide more favorable differences in income at the peak than do the salary professions, of which forestry is one.

(2) But the forester is definitely not underpaid, and his income compares not unfavorably with the earnings of other professions, both fee and salary, in particular with high school and college teachers, and social workers.

(3) It would appear that the forester's income provides him with aids for his professional growth, even with modern comforts and luxuries for his family, but not to the extent that the feeling of personal service and sacrifice is cast aside. The average forester still considers himself a missionary.

(4) It is the writer's opinion (statistically unsubstantiated, however) that during the depression the salaries of foresters generally have fluctuated less than practitioners in the fee professions. This

TABLE 1

COMPARISON OF MEDIAN EARNINGS IN SPECIFIED PROFESSIONS

Profession	Median peak income
Forestry; both graduate and undergraduate practitioners[1]	$4,000[2]
Dentistry; both general practitioners and specialists[3]	5,047
Engineering; general practitioners[3]	6,271
Law; general practitioners[3]	7,410
Medicine; both general practitioners and specialists[3]	5,553
Ministry; Diciples of Christ and Methodist[3]	2,501
Social work; family case workers[3]	3,062
Teaching; junior and senior high teachers and principals[3]	2,616
Teaching; college and university teaching staff[3]	3,852
Y.M.C.A. secretaryship; boys, physical, and general secretaries combined[3]	3,480

[1]Adapted from *Forest Education* by Graves and Guise (1932).
[2]At 20 years after graduation, which is approximately the period of peak income in the fee professions.
[3]Adapted from *Compensation In The Professions* by Bartlett and Neel (1933).

statement, of course, does not consider the hosts of new jobs created for foresters as a result of the various national emergency conservation projects, but does consider various governmental salary reductions.

(5) A great weight of evidence would indicate that the hundreds of foresters who have received positions in the various emergency conservation projects since *Forest Education* was written have lowered the median income in the forestry profession. Accordingly, there now exists a condition in which more foresters have employment in forestry than ever before, but at a decrease in the average earnings of professional workers.

A comparison of incomes is interesting, which may be reason enough for making one, but there would appear to be more to the subject than merely satisfying curiosity as to the variations in different professional earnings.

Let us pursue the matter a little further.

Numerous foresters—at least those who are socially minded—believe that certain services, which only technically trained foresters are equipped to render, are essential for our social and economic welfare. Furthermore, they maintain that these essential professional services must be furnished without interruption regardless of how troubled conditions in the land may be. This growing belief is not as Utopian as it may first appear. Have we not long recognized that certain essential services—education, public health, spiritual guidance, and the care of "the lame, the halt, and the blind"—must be provided for by society whatever the economic condition?

Although a planned economy, self-regulating and nationalistic in scope, may as yet be only an ideal, there are many intellectual leaders in the country who are positive that eventually the collective welfare is going to be provided for regardless, or in defiance, of private profits. Whether or not our venerable and tottery economic system is on the skids the present writer is not prepared to say. However, he does believe that, unless a capitalistic war blows down the trees in our already shallow-rooted economic woods, a new social policy will emerge from the dumps into which the world was catapulted.

Under a planned economy the forestry profession would be expected to reply to several questions, the answers to which it at present either ignores or else does not know. For instance, what is the minimum quantity and quality of professional services necessary for public welfare? By what process would the profession regulate the supply of such services in proportion to demand? To what extent would the public be able to support the services that the forestry profession might consider essential?

The writer would be guilty of a gratuitous insult to the forest educators of the country if he did not give them credit for being aware of the problem inherent in an over supply of practitioners. For example, Professor Emanuel Fritz of the University of California, a shrewd and articulate analysist of the situation, has for a number of years recommended preparing a larger proportion of forest school graduates for private employ rather than public service. "In the next 10 years," he writes in the May (1934) issue of the Journal of Forestry, "American forest schools will graduate about 4,000 professional foresters. Under the present system, all but a few will be trained and fitted for the public services."

It requires only a very rudimentary conception of social economy to understand why the supply of practitioners must be kept in proportion to demand. The law applies equally as well to forestry as to other professions; when the supply of practitioners is greater than the need for them, compensation is low.

Twenty years ago the demand for foresters was greater than the supply, hence more persons were attracted to forestry and prepared for it. The saturation point was reached probably in the late 1920's. It is a mistake to imagine that the depression of the early years of the 1930's was the cause of this excess of supply over demand; the depression merely emphasized the fact that jobs were becoming scarcer, that remuneration was decreasing. It is true that the emergency conservation work program checked the swing toward wholesale unemployment in the forestry ranks, and even created more jobs than ever before, but the E. C. W. is only a stop-gap and does not invalidate the original argument.

Equilibrium of supply and demand in forestry, to a greater extent than in other professions, must be attained by regulating the flow, which can best be accomplished at the source—the school. Probably the most essential reason why it is desirable to regulate the number of candidates for forestry education at the entrance of the forestry schools, rather than at the exits, is because in forestry no system of licensure or certification exists, as in medicine, law, dentistry, pharmacy, and teaching.

Several methods have been proposed whereby this devoutly to be wished for consummation is to be brought about; by exercising greater care in the selection of students, by limiting their number, by higher standards of preparation, and by weeding out schools that fail to meet professional standards of equipment and instruction.

The medical profession faced this serious problem at the turn of the century and, characteristically, did something about it. From 153 medical schools in 1904 the number had dropped to 76 twenty-five years later. Physicians improved the profession of medicine by the simple expedient of making it more difficult to become a medical man, and now, unless a candidate for the medical degree is genuinely intelligent, it is almost impossible for him to become a physician or surgeon. If the Society of American Foresters could assemble a committee on forest education as wise and courageous as the American Medical Association's Council on Medical Education there would be less justice for remarks such as this one made by Arthur Newton Pack in his *Forestry: An Economic Challenge* (1933), "one must admit reluctantly that the general level of the profession is one of forestry's unmentioned problems."

It is repugnant to certain of our democratic ideals to close the approach to an education, professional or otherwise, to the young aspirant. And yet we know that some of our most democratic institutions are among the most wasteful. Preparing an oversupply of foresters is not only wasteful of effort, time, and money, but tempts them to unethical practices. In order to obtain jobs, foresters have been known to underbid others in salary, and, what is worse, to use political influence to displace those who already held positions. He is extremely naive who doubts that such things have happened.

No discussion of the compensation of foresters would be complete without mention of the matter of security of position. Industry and state employ probably afford the least security in tenure of office, whereas federal employ and the schools undoubtedly provide the greatest. Consequently, it might be argue that practitioners in industrial and state employ are, by reason of the risk they run of loosing their positions in times of economic and political stress, entitled to higher compensation than, for example, the forester holding a civil service position in the U. S. Forest Service. For the latter job is the most stable and secure in the whole profession; the incumbent, with good behavior and ordinary attention to duty, is certain of holding his po-

sition until he reaches retirement age, when he goes on a pension.

On the other hand, the positions of foresters employed by, say, coal companies and many of the states, are apt to be, and frequently are, jeopardized by changes in management and administration. Graves and Guise found that "A man has the opportunity to earn more money by going into industry than he can earn in public service." This, it can hardly be disputed, is just; he is entitled to greater compensation because he takes a heavier risk of losing his job when dividends fall off.

To return to the questions propounded in an earlier paragraph. Of course, nobody knows the answers. But if and when we ever do attempt to answer them, it might be well to adopt a realistic attitude and not overlook the matter of salaries. In a word, we might profitably consider, and, under the guidance of the Society of American Foresters, possibly adopt certain criteria of compensation which foresters may accept as standard earnings to be received for definite professional services.

Comments

Are foresters underpaid? Broadly viewed, this is an all inclusive question. It strikes to the very root of our profession. The correct answer, if there be any, lies beyond the realm of selfish hopes and personal desires. Only when professional preparation, the character and ability of the men in the profession, the demands made on foresters above and beyond the line of duty, the indirect satisfactions resulting from the practices of the profession, the rate of promotion, the contribution forestry makes to the general social and economic complex, and a host of other factors are considered is even an approximation of the correct answer to the question possible.

It is a difficult enough task to analyze the basis of the wages, and here and elsewhere in this discussion the term "wages" is used in a broad sense, paid to different individuals in the same organization or activity. It is a doubly difficult task to attempt to find a reasonable and rational basis for the comparison of wages of individuals engaged in different occupations, tasks, or professions.

In a general way, there is a relation between ability, native and acquired, and the wages commanded by workers. Higher wages are associated with higher degrees of ability—lower wages with lower degrees of ability.

Mr. Clepper has attempted to analyze some of the factors which are influencing the salaries of foresters. It is a matter of great indifference whether the individual reader agrees or disagrees with Mr. Clepper's conclusions. The important thing is that foresters do some sound, constructive thinking on a subject which so vitally affect their profession.

Henry Schmitz,
Associate Editor.

A STUDY OF LAND UTILIZATION IN GRAFTON COUNTY

By K. E. BARRACLOUGH and C. E. WALKER

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This paper is a preliminary statement on a land utilization study now in progress in the Dorchester region of New Hampshire under the direction of H. C. Woodworth, Agricultural Economist of the New Hampshire Experiment Station. The authors have assisted in making a survey of the forest resources of the Town of Dorchester. How the land has been utilized from early settlement is briefly reviewed. The present forest resources of the area and their utilization is discussed. Public ownership of most of the woodlands along with a directed policy of social progress for the people is suggested as a possible solution to the problem.

FOR many years there has been a definite trend away from the land, and this is especially true where the ground is rough and rocky, or the soil is unproductive. The decline in agricultural acreage started prior to the civil war at which time in New Hampshire the acreage in pasture and tillage was 2,367,000 acres. In 1890 this acreage had been reduced to a little over 1,000,000 and by 1930 it was under 1,000,000 acres. This decline of agricultural acreage has been fairly constant for a long while, but it is slowing down, and may even have reached a standstill. At the present time many city people, affected by the depression, are looking toward the land for a livelihood. This is probably a good thing, both for the people and for the land. The question is, however, will they go back to our rough and rocky New Hampshire hill farms that need to be reclaimed from the forest, when there is good farm land available in other sections at a reasonable price? It is feared that those who are induced to spend what little savings they may have for such types of farms will learn all too soon the difficulties they are in.

Farm abandonment in New Hampshire up to the present time has not resulted in the complete breakdown of the political units of the state government. Even in our most backward towns where real farming has not been carried on for many years, the town unit has survived, mostly because the landowner has derived an income from the timber growing therein. In the southern part of the state the abandoned fields and pastures quickly seeded to even-aged stands of white pine, and in the northern half spruce and fir reclaimed the idle fields. For the quarter of a century preceding 1920, millions of feet of lumber went into boxboards, thousands of cords of spruce and fir into pulp, and there was a ready market for hardwood in the form of fuel and lumber. In many instances the owners of abandoned farms derived small fortunes from them and the diminishing population in the back towns has been able to continue the building of roads and to educate the children. During late years, however, changes have taken place which have gradually placed our forest towns at a disadvantage. With continued farm abandonment, combined with increased costs for public improvements, there has been placed an increasing tax burden upon the forests. At the same time the boxboard market gave way to the use of the paper box and the bulk of the boxboard business gradually shifted to the west coast. Coal and oil have shut off a good market for fuel wood, and pulpwood cannot be marketed at present in competition with imported pulp. Even native lumber cannot compete with the well

manufactured material from the west coast. Beside these many difficulties, the New Hampshire forests have been depleted, and while there is now more land growing trees than there was 60 years ago, there is less acreage in good timber. Doctor Toumey in one of his papers on New Hampshire forests said, "We have grown cockle and tares instead of wheat and barley."

Such changes and others have placed our back-hill communities in a rather precarious position. This general condition of our non-agricultural towns caused Mr. Woodworth, in charge of the Farm Economics Department of the Experiment Station at the University of New Hampshire, with the help of Doctor Abell of the same department, to undertake a land utilization study in Grafton county, with the town of Dorchester as a center. The region is rough and rocky hill land between the Connecticut and Pemigewasset valleys. Messrs. Woodworth and Abell are collecting all possible agricultural information in Dorchester and the surrounding towns, besides gathering data on the cost of maintenance of roads, schools and other public expenditures necessary to meet the normal needs of the people of the region.

Since 87 per cent of the land area in the town of Dorchester is wooded, it was important to ascertain in what manner the forests contribute to the livelihood of the people. The junior author was selected to map the town and to make an estimate of the standing timber. Professor Woodward and the senior author worked up the procedure for the survey. Walker worked alone, noting types and age classes of the forest cover, and secured other information such as location of roads, cellar holes, observations as to the abundance of game, etc. The U. S. Geological Survey topographic sheets of the region were used as a base map. This was separated into blocks with definite boundaries and with these as bases, strips were paced back and forth across each block, on the cardinal directions of the compass until the entire town was mapped. This method proved accurate to within two chains. From old property maps and field observations property lines were established. The timber estimate was made with the help of Messrs. Herr and Barraclough at various times during the summer. One-fourth acre plots were taken in the merchantable timber, on which were measured the diameters of all trees down to six inches. While a two per cent estimate of the total forest area seems low, it provides a figure of sufficient accuracy for the purpose of the survey. The forest types classified were aspen; paper birch; pine-gray birch; white pine; northern hardwoods; spruce-fir; cut-over; poor pasture; good pasture; tillage land; and meadow.

The annual growth was determined but can be used only as a rough estimate. The mean annual increment for several age classes was found by dividing the volume of each type by its age, and from these figures a curve was drawn. Since many of the stands were not even-aged the method is far from accurate. In spite of this, the resulting curve was fairly smooth. The maps and estimate for the town of Dorchester have been completed. Strips will be run in some of the adjoining towns this spring.

In order to understand the present state of affairs in a back town such as Dorchester it is necessary to review briefly its history. The town was settled in 1772 under a charter granted by Governor John Wentworth following the efforts of a Mr. House of Hanover who received certain rights in attending to the settling of the town. The Governor received 500 acres of good land for granting the charter. That same year, upon the effort of Governor Wentworth before the general assembly, a bill was passed to build a road from the Governor's house at Wolfeboro to Hanover, so that it might be more convenient to reach Dartmouth college from the central part of the state. This was the first road through the

town of Dorchester and naturally the first settlement was along this road in the vicinity of Thompson hill. The town developed rapidly during the next 70 years. In 1840 the population had reached a maximum of 840 persons and agricultural development was at its height. At this time, which was the beginning of the opening of the West, the population began to decrease and the gradual abandonment of farms had started. In 1840 it is estimated that 11,500 acres, 39 per cent of the town's total 29,271 acres, was cleared land, while today only 1,011 acres, or 3 per cent of the total acreage, is tillage; 2,248 or 8 per cent pasture; and 25,516 acres or 87 per cent woodland. One-fourth of the present pastures are in good shape while 44 per cent are about half grown to trees. The town now has a population of 115 inhabitants, and only three of the 25 families can claim ancestral background in the town. The majority of the families residing in Dorchester have been brought in during the last five decades through the activities of real estate salesmen. While at one time there was a sufficient number of children in the town of Dorchester to keep 11 schools occupied, last year, 12 pupils, 6 of which were from the adjoining town of Groton, attended one district school. This year the school population has jumped from 12 to 24 and two schools are being kept open during the winter, when transportation is difficult. From information obtained in an article in the Geographical Review for October 1927, written by Professor Goldthwait of Dartmouth, on the adjoining town of Lyme and from histories of early New Hampshire, we learn that when agriculture was at its height in this region the principal crops were winter rye, barley, flax, oats, peas, and potatoes; and there was an abundance of pork, beef, mutton, poultry, and cheese. There appears to be a gradual falling off of cultivated crops while the raising of sheep and beef held up fairly well and continued to be one of the chief occupations until 1890. Today in the town of Dorchester there are 44 horses, 54 cows, 7 neat stock, 34 sheep, and 1,567 fowl, while back in the woods, on the forest-covered slopes of Smart's mountain, one finds the high stone walls and inclosures and the rudely outlined foundations of sheep barns and sheds, relics of a by-gone age of rural prosperity.

It is apparent that as agriculture gradually declined the diminishing population became more and more dependent upon the forest for a living. The abandoned fields and pastures of the town rapidly produced excellent stands of spruce and fir, which reached their maximum about the time there was a sharp demand for pulpwood. The map prepared by the Forest Survey party that typed the region in 1905 shows that about 16 per cent of the forests of Dorchester was even-aged spruce and fir, while today this type covers only 7 per cent of the forested area. It is easy to visualize the labor involved in getting out thousands of cords of pulpwood and lumber, and no doubt the men of the town found it much simpler to work in the woods and receive a steady weekly pay than to try to seek a living from the stony land.

Most of the land of Dorchester changed hands during the late 19th century. One of the few old settlers of the town states that during the hard times of 1870 to 1894 several hundred acres of land came back on the town for taxes, and the town was forced into debt over $18,000. He goes on to say that this condition made it very difficult for the taxpayers of the town, but there was still a sufficient number of active farms to carry the burden. Soon after 1900 and especially after the start of the World War in 1914 there was such a demand for spruce that the selectmen were able to sell all of the woodland held for taxes, and to pay off the town's indebtedness. Today Dorchester is one of the few back towns not in debt.

Within the last few years out-of-state

people have established summer homes in Dorchester, which has helped to provide a much-needed source of income in the form of taxes and has given some employment to the inhabitants. However, there has been no general influx of summer people as in some parts of the state. There are 12 summer homes, one girls' camp on Cummings pond, and several hunting camps. The town offers recreational attractions that should interest some people. Several hills afford sightly views. Thirty-five miles of old roads are suitable for bridle paths and about 10 miles of foot trails are in fair shape. Eight ponds, 2 of them over 100 acres each, and several attractive brooks draw many fishermen, but upon questioning, it is learned that while there is plenty of fishing few fish are caught. There is also a noticeable lack of sandy beaches along the shores of the ponds. There appears to be a general scarcity of game for during the nesting season on the average of one nest of partridge was flushed daily, while only 12 deer, mostly does, were seen during the entire summer. No bears were found, although there was evidence where they had worked around berry patches. There were a few signs of beaver about Cummings pond. Only three foxes were seen but there was an abundance of porcupine.

As to the distribution of forest types, northern hardwoods covered 74 per cent of the total forested area; spruce-hardwood 11 per cent; spruce-fir 8 per cent; pine-hardwood 2 per cent; white pine 1 per cent; white birch 1 per cent; and popple, grey birch, and cut-over make up the remaining 3 per cent.

The timber estimate shows a stand of 6,551,909 cubic feet of merchantable hardwood and 6,526,128 cubic feet of softwood, which does not include 4,160,000 board feet of white pine. Also there is estimated to be 150,865 cords of hardwood not suitable for lumber. Although there is a much greater acreage of hardwood there is almost exactly an equal merchantable volume of softwood. Softwood is common in the hardwood types, while the softwood types are practically pure and there are more merchantable trees to the acre of softwood than hardwood.

It is estimated that the woodlands produce annually 325,000 cubic feet of logs suitable for lumber, about 200,000 cubic feet of which is softwood. The total annual growth, including that which is not merchantable for lumber, is about 675,000 cubic feet. The annual growth per acre for merchantable hardwood is estimated at 9 cubic feet and spruce 33 cubic feet.

The present quality of the timber growth is decreasing. The forests were badly cut especially during the war. Over a large acreage of northern hardwoods, culls dominate and this will seriously reduce the quality of the younger growth. With each cutting there is a tendency for weeds such as soft maple to increase. Much of the good ash has been cut. The estimate shows 468,500 cubic feet of merchantable ash on the stump, one third of which is under 80 years.

In general the stumpage is not difficult to get out. The 34 miles of roads are fair although rough and steep. There are three portable sawmills in the town which operate occasionally and which turn out poorly-manufactured lumber and a few ties. Just now a portable sawmill is set up in West Rumney and is manufacturing good hardwood lumber, but it is questionable how long this mill will continue to run. Much of the pulp from the region has gone to Lincoln. The ash, maple and beech, and birch have gone to Warren, Lebanon, and St. Johnsbury. Under present conditions, cuttings of any consequence apparently do not hire much local labor, but bring help in from the outside.

The ownership of the land is divided among 105 individuals and corporations. Fifty-nine townspeople own 20 per cent of the land, four corporations 30 per cent, 13

non-resident farmers 11 per cent; non-resident private woodland owners 36 per cent, 12 summer people 2 per cent, and 1 per cent is disputed.

The assessed valuation of resident real estate is $50,285 and non-resident real estate $209,260. The tax rate for the year 1932 was $1.98 per hundred dollars of valuation. The non-resident property owners pay 80 per cent of the total real estate tax. As near as can be estimated 65 per cent of the total real estate tax is levied on the woodlands. The $3340. tax placed on woodland is about equal to 45 per cent of the value of the annual merchantable stumpage increment based on $3.00 a thousand value. No value can be placed on the cordwood.

For the year 1931, $9,068 was spent to carry on the necessary work of the town. The state, through the operation of state laws, contributed about $2,100 of this total expenditure. Fifty per cent of the expenditures went toward the upkeep of the 34 miles of road. Twenty-three per cent of the total expenditure was used to maintain the town schools, and the sending of 3 pupils to high school in Plymouth. State and county taxes took 14 per cent. The salaries and expenses of town officials represented 8 per cent of the total. Other town expenditures such as protection of property, etc., made up the other 5 per cent.

The inhabitants of the town have little or no money. Perhaps one family in the town is in the position where it need not worry as to the immediate future. One man states that he owns too much timber land and fears he may be forced to default his taxes. Another man borrowed on his insurance to meet current bills last year but has not attempted to improve his property for years. The majority of the people live from hand to mouth and without employment in the woods, they are almost entirely dependent upon the work they get on the road and the little extra they can pick up here and there. As to road work, there is an end to the length of time it is possible to take money from one pocket and put it into the other. One of the summer residents did some improvement work on his pine plantation this last fall in order to provide a little labor for a few of the local people. A sawmill that is operating in a nearby town is paying $1.00 a day and the men board themselves.

With this information at hand and further data that will be collected, it is hoped that it will be possible to formulate a procedure of land management that will be for the best interests of the people in the region and the people of the state. As things stand, what is the outlook for the town of Dorchester? With no immediate income from stumpage how long can the owners continue to pay taxes? Several of the owners of stumpage in the town will probably be forced to let their land go for taxes unless some unforeseen action is taken in the near future. It is a question how long corporations will continue to keep scattered holdings under existing conditions. Already two non-resident woodland owners who pay in over $600 in taxes each year have started to clear the stumpage off their holdings, and the selectmen admit that the land will probably come to the town for taxes. Last year in Dorchester some 4,891 acres of woodland came onto the town for taxes. The outlook for towns like Dorchester is not bright. There is no reason to expect an increase in stumpage prices for several years, and consequently stumpage owners will make no effort to improve the quality of their growth, even if they are able to hold on. If much land does come back on the town for taxes it is difficult to see how Dorchester, as well as many of the surrounding towns, can carry the load.

Several other states have been forced to struggle with this problem in a large way. It is a fortunate thing that the purchase of the White Mountain National Forest in New Hampshire took up much land that

probably would be up for taxes right now if it had remained in private ownership.

It is hoped that this study now under way may result in a definite land policy for the state of New Hampshire. It is a problem that deeply concerns the forester, because without his assistance no satisfactory land survey can be made, without his coöperation no suitable land policy can be formulated, and without his support no program for the development of the land can successfully be carried out.

It is the senior author's opinion that no matter what the future development of the Dorchester region may be, it will be to the best interests of the people to have the bulk of its woodlands in public ownership. Fortunately the Dorchester region is adjacent to the White Mountain National Forest, and the forest could conveniently be extended to include this region.

If such a course was pursued, the federal government in coöperation with the state should develop a plan whereby the inhabitants of the region would have the opportunity of maintaining themselves in a comfortable manner. With the bulk of the woodlands in public ownership, it should be possible to develop markets for the timber products with the objective of caring for the annual timber growth, and at the same time build up the forest. The recreational features of the region could be developed. Such a move would stimulate the summer and winter tourist business. The inhabitants of the region should be encouraged to carry on the kind of agriculture that will meet their needs and those of the tourists. Permitting families to move into isolated farm homes on back roads that are for the most part lacking in modern conveniences that people should enjoy is not usually conducive to the social development of such families and is expensive to the taxpayers. The inhabitants should gradually be encouraged to settle in and about small centers that are well located for the promotion of the social and commercial development of the region.

FOREST FIRE DAMAGE STUDIES IN THE NORTHEAST
I. Bark-Beetles and Fire Damaged Hardwoods

By PAUL W. STICKEL

Associate Silviculturist, Northeastern Forest Experiment Station[1]

In reporting the damage to trees scorched lightly at the base by fire the average fire warden and even the technically trained forester is given to stating that little harm has been done providing the tree crowns remain green. Such a statement is far from being correct, failing as it does to take into account the aftermath of insect and fungus damage which invariably follows even the lightest of surface fires. In the case reported herein, over 50 per cent of the fire-scorched hardwoods showed signs of the presence of ambrosia-beetles, whose work, even if the trees continue to live, causes a serious reductior in quality of the wood of the most valuable part of the tree—the butt log.

DESPITE Hopkins' early statement to the contrary (2), forest entomologists are generally in agreement as to the important relationship between fire-injury in standing timber and insects. In the case of coniferous species and the true bark-beetles, this association has been emphasized by such workers as Craighead (1), Keen (4), Miller and Patterson (5), and Swaine (6). As far as the writer is aware, the relation of fire injury to ambrosia-beetle attack in hardwoods has not received much consideration in the literature. In fact, aside from the brief descriptions found in such standard taxonomic works as Swaine (6), only one comprehensive account of this specialized group of bark-beetles has been published. This is to be found in the long-out-of-print and now very rare paper by Hubbard (3).

Although the presence in the tree of both true bark-beetles and embrosia-beetles is readily detected on the surface of bark by means of the small round entrance-holes and the fine, whitish boring-dust, a removal of the bark will disclose that, whereas the galleries of the true bark-beetles are superficial and lie within or just under the bark, the galleries of the ambrosia-beetles penetrate into the wood. Since their borings can penetrate the hardwood in every direction, and thus riddle it with holes, the ambrosia-beetles are capable of largely destroying the value of the wood for the more exacting purposes. Furthermore, since these beetles are always associated with embrosia fungi, from whence they get their name, the wood in the immediate vicinity of the galleries is usually blackened or stained. This still further reduces the grade of the wood and its value in the market.

Field Data

In the course of establishing permanent sample plots on which to study the mortality and decadence of fire-damaged trees, an excellent opportunity was afforded during the summer of 1933 to observe the relation of fire injury to ambrosia-beetle attack. At Ramapo, Rockland County, New York, a forest fire, covering approximately 150 acres, occurred on April 24, 1933. The forest, second-growth in character, falls within the scarlet oak-black oak (*Quercus coccinea* Muenchhausen—*Q. velutina* La Marck)[2] cover type,[3] although in this case

[1]Maintained by the U. S. Department of Agriculture at New Haven, Connecticut, in coöperation with Yale University.

[2]Botanical nomenclature according to G. B. Sudworth: Check List of Forest Trees of the United States, their names and ranges. U. S. Dept. Agr. Mis. Cir. 92, 295 p. 1927. Entomological nomenclature after Swaine (6).

[3]Forest cover types of the eastern United States. Jour. For. 30 (4): 451-498, 1932.

black oak is absent. The stand is predominantly scarlet oak, with such associates as red, white, and chestnut oaks (*Q. borealis*, Michaux f., *Q. alba* Linnaeus, and *Q. montana* Willdenow), pignut hickory (*Hicoria glabra* (Miller) Sweet) and occasionally paper, gray, and black birches (*Betula papyrifera* Marshall, *B. populifolia* Marsh, and *B. lenta* Linnaeus), largetooth aspen (*Populus grandidentata* Michaux), sugar maple (*Acer saccharum* Marshall), and sassafras (*Sassafras variifolium* (Salisbury) Kuntze).

During August, 1933, or about six months after the fire, a 150-foot square plot was established in the burned-over area. Not all trees on the plot were tagged and measured; only those which were scorched at the base and still alive, were selected for future study. All told, 116 trees over 0.5 inches d.b.h. were selected for observation. Their diameters varied from 1.5 to 12.5 inches d.b.h. with an average of 5.3 inches, while the heights ranged from 18 to 60 feet with an average height of 41 feet. In general, the area can be classed as site 1 for the oaks which formed the major portion of the stand.

Upon examining the individual trees for the purpose of delimiting areas of bark discoloration, it soon became evident that ambrosia-beetles were present in many of them. The final check disclosed that 62 of the 116 trees, or 53 per cent, were infested with these insects.[4] It is believed that an examination of the trees next year will show that this percentage is even greater. Even during the brief period spent on the area while laying out the plot, it was apparent that the infestation was spreading rapidly. Many trees which on first inspection showed no signs of beetle work had entrance-holes and boring-dust on their bark a few days later.

One point of interest was noted as far as degree of damage and insect attack are concerned. On trees with only one degree of bark discoloration, i.e. scorch, the beetles were usually lacking. Where they did occur on trees having all three degrees of bark discoloration—scorch, char, and burn—their entrance-holes were most numerous in the zone of charred bark. Since in these hardwoods the extent of cambial wounding and subsequent drying out of wood tissue follow very closely the zones of charred and burnt bark, it would seem that these ambrosia-beetles prefer working in the more badly fire-injured trees. In fact, subsequent findings may prove that the presence or absence of these insects is an excellent index not only of the initial degree of injury but also of probable future recovery.

Specimens of the ambrosia-beetles were collected and identified in the laboratory. The species found in each host are given in the following list:—

Scarlet oak—*Pterocyclon fasciatum* Say.

White oak—*Pterocyclon mali* Fitch and *Xyleborus saxesceni* Ratz.

Chestnut oak—*Xyleborus saxesceni* Ratz.

Black birch—*Xyloterinus politus* Say.

Gray birch—*Xyleborus saxesceni* Ratz.

Paper birch — *Anisandrus pyri* Peck, *Pterocyclon mali* Fitch, and *Xyleborus saxesceni* Ratz.

Sugar maple—*Xylaterinus politus* Say and *Xyleborus saxesceni* Ratz.

Largetooth aspen—*Xyleborus saxesceni* Ratz.

Sassafras—*Xyleborus saxesceni* Ratz.

Aside from illustrating the close relationship between fire-injury and bark-beetle attack in hardwoods, the facts cited above emphasize the need for making more than one inspection of burned-over areas if accurate fire damage appraisals are to be obtained. There is little doubt that in the

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[4]In no instance, either on the plot or adjacent to it, were ambrosia-beetles observed working on trees not injured by fire.

case in question an inspection made immediately after the fire would have failed to disclose the presence of ambrosia-beetles. It seems highly essential, therefore, that fire-injured trees be allowed "to season" before attempting to ascertain accurate damage data.

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One of the theories accounting for the prairies, ascribes them to the fires annually set by Indians for driving game, or for favoring the growth of grass that should attract deer and other game to this pasturage; and so far as relates to "oak openings," "barrens," and the prairies east of the Mississippi, this theory has the strongest ground of probability. However this may be, we have these facts before us, that scarcely a year passes without the occurrence of forest fires of sufficient extent to attract public notice; that they are particularly prevalent in seasons of protracted drought, and more frequent from year to year as these droughts become more frequent and more widespread in their effect.—*Report Upon Forestry* by Franklin B. Hough (1877).

THE CLIMBING METHOD FOR TAKING TREE MEASUREMENTS IN PLANTATIONS OF THE CENTRAL STATES

By LEONARD F. KELLOGG

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One of the great immediate needs in American forestry is additional volume and yield data. In the past such studies have usually been conducted on felled trees or in a few cases measurements of standing trees with the use of climbing irons have been taken. The author in the following article describes a new technique for studies on standing trees, which not only affords greater safety to the climber but also makes it possible to collect the required data with minimum damage to the tree.

VOLUME tables are essential to a yield study. In the investigation of the success of plantations conducted by the Central States Forest Experiment Station, yield of wood has been taken as a measure of successful planting. The production of wood was not the sole aim of pioneer tree planters, who frequently sought shade and shelter. Such benefits are intangible in nature and do not lend themselves to measurement as does the volume growth of plantations. With yield used as an index of success, the construction of volume tables became an integral part of the study. From 1929 to 1932 a total of almost 800 stems of black walnut and black locust has been measured for this purpose.

In yield studies of natural stands, logging jobs and other cuttings are used to secure stem measurements. For plantations such cuttings may not exist, and the scattered nature of the stands over a wide territory, diversity of ownership, and difficulties of ascertaining the locations of cuttings make it next to impossible to depend on cut trees as a source of tree measurements. In the case of planted black walnut, return cards sent out to farmers whose groves had been visited the preceding season, brought no information of cuttings to be made.

The Liljenstrom dendrometer, an instrument of European make, was suggested for taking stem measurements. The field party which tested the dendrometer climbed the same trees to secure actual measurements and therefore a check on the accuracy of this instrument. The results of this comparison have been reported by Winters[2] and clearly indicate that in plantations serious errors are introduced by the use of this instrument, because of the small diameters measured, the toss of the tops by the wind, and lack of excurrent form in most hardwoods. The remaining alternative was to climb the trees for measurements.

Organization

For securing tree measurements of black walnut in 1929, a three-man party was used: one trained climber, one recorder, and the chief of party who scouted ahead for stands containing suitable trees.

For the study of black locust in 1932, a two-man party was used, both members of which were proficient in climbing. The leader was trained in a well-known organization of tree surgeons and his companion

[1]The Central States Forest Experiment Station is maintained at Columbus, Ohio by the U. S. Forest Service, in coöperation with Ohio State University and the Ohio Agricultural Experiment Station.

[2]Winters, R. K. 1930. Suitability of the Liljenstrom Dendrometer for Reading Diameters of Trees in Black Walnut Plantations. Journal of Forestry, Vol. 28 (4): 511-514.

had considerable practical experience. With this arrangement, the two men took turns in climbing.

Selection of Stands for Measurements

Because of the scattered occurrence of plantations, the selection of trees to be measured is an important detail. The time and travel cost becomes greater as the region covered by the study becomes more widespread; yet a representative set of data, which fairly samples the region, is essential for accurate tables. In the study of yield in natural stands, adequate stems are measured for each diameter and height class over the range of sites and ages for the species being studied. In the case of plantations, an added factor, *original spacing*, must be considered. Although the effect of spacing may be relatively unimportant in the later life of the stand, its importance in early life is very definite. In order to be representative, then, the selection of trees to be measured must consider (in the case of plantations) not only diameters, heights (sites) and age, but also original spacing.

In the case of black walnut, in order to effect economies in field supervision and time, volume table measurements were taken before a majority of the yield plots had been established. The effort was made to secure an adequate sample in each height-diameter class. Fortunately, ages were well represented, and spacings were moderately well represented, although the spread of spacings was excessive and varied from 2½ x 2½ feet to 20 x 20 feet.

In the case of black locust, the limits of the universe were approximately known prior to initiation of measurement of stems. The spread of original spacings extended from 3 x 3 feet to 10 x 10 feet. The range of ages was 1-50 years. The limits of site were well defined. Consequently, a selected list of plantations was prepared which regularly sampled the ages, the heights, and the original spacings. By this procedure the travel cost was cut down to a minimum consistent with the degree of sampling desired.

The field party was instructed to relocate the plots in these particular stands, select a row of trees covering the range of diameters on the plot, and measure 15-18 trees consecutively, just as they came. The personal factor entered only into the selection of the row to be measured.

Equipment

For such a task the field party has to be very mobile. Consequently, a car of the light truck or pick-up body type was used to transport the crew and the paraphernalia. On the left side were placed two brackets, one bolted to the body frame and running board just ahead of the front door, and the other bolted to the steel side of the body box behind the rear fender. On the hooked side-arms of these brackets a 14-foot extension ladder and a sturdy 10-foot bamboo fish pole, graduated in half-foot lengths, were securely strapped.

Other equipment peculiar to this study consisted of 150 feet of ½-inch hemp rope and a white oak swing board 1½" x 9" x 22". A serviceable safety belt and strap was included and the climbers were instructed to use it as an item of safety; they found it chiefly valuable when small slender trees were measured from the extension ladder.

Regular equipment, common to the taking of stem measurements, consisted of: a 100-foot steel tape (graduated in tenths of feet) with reel, 2 diameter tapes (10 foot), 1 Swedish bark measuring instrument, 1 large aluminum tatum, 1 fountain pen and supply of Higgins' "Eternal" ink for recording the measurements, and a supply of Form 558-a of the U. S. Forest Service.

An "S" hook made of fence wire (similar to that used to hold a pail in a cherry tree) was fashioned and attached to the ring in the zero end of the tape.

Technique

On cut timber, the measurement of stems usually begins at the stump and proceeds to the tip. In climbing trees, the process is reversed and measurements are taken from the top downward.

The technique may be briefly outlined. The rope is coiled at the butt of the tree. A 30-inch loop is tied in the free end of it, fixed by a bowline knot. By means of the 14-foot extension ladder, the climber gains perhaps 25 feet of height. With his head and one arm through the loop and the rope feeding out from the coil on the ground, the climber "shinnys" or "swarms" up the tree, breaking off dead limbs which may fail under his weight or impede his progress, as he goes. When the sturdy limbs are reached, it is a simple matter to climb to the top. At the highest dependable crotch (preferably an open or flat one) he braces himself, unties the knot and feeds the rope over the crotch hand over hand until the dangling end is within reach of the recorder on the ground below.

On the other end of the rope is tied a swingboard (Fig. 1) allowing a 30-inch loose end. Through the strands of the rope just above the swing-board is hooked the zero end of the steel tape, one end of the graduated cane pole, and the Swedish bark-measure. By pulling on the loose end of the rope, the ground man hoists the swing-board up to the crotch in the tree top, feeds out the steel tape along the stem of the tree, and provides the climber with his bark-measurer and cane pile.

The total height is first measured by direct taping and use of the graduated cane pole. When the climber has mounted to the highest point which he can reach safely, the recorder reads the tape at the ground level, and to this reading is added the length of the tip measured with the cane pole. Usually the recorder snubs the tape at the last multiple of the regular interval at which measurements are required. As the climber measures the tip, he calls it out to the recorder below. The cane pole is dropped to the ground after measurement of the tip.

The diameter and bark thickness are taken at this highest point. In both studies the climber has measured the diameter at 2 inches or less in the top, with comparative safety. Returning down the stem to his swingboard, the climber measures the diameter and bark thickness at any distance from the ground requested by the recorder. The tape is prevented from falling to the ground by simply hooking it on a limb. On reaching the swingboard, a special slip knot is tied with the 30-inch loose end on the standing part of the rope (Fig. 2), the climber seats himself on the swingboard, hooks the zero end of the tape on his clothing or the board, and by straightening the slip knot descends to the next lower point for measurement. His descent can be arrested by releasing the knot or by seizing the standing part of the rope as it feeds past him. Each interval of length is measured by the recorder on the ground who holds the desired reading of the tape at the butt of the tree.

A few other details are worthy of mention. When question arises regarding the consistency of bark thicknesses, the climber can easily swing around to any side of the stem and take additional measurements to establish a better average figure. In case he descends too far, he can easily elevate himself by pulling on the standing part of the rope and slipping the knot upward on the slack. Other measurements easily secured by the climbing method are (1) diameter o.b. and i.b. at ½ height above d.b.h. (for studies of form class); (2) height to base of crown; (3) clear length; (4) straight or merchantable length; (5) diameters at percentiles of total height; (6) increment borings (to study diameter growth at different points and sides on the stem), and (7) seasonal diameter growth.

Safety

Question may be raised as to personal safety with this method. In any work off the ground, personal caution and assurance are large components in the safety of the workman. It is highly advisable to secure experienced labor. Those who are not careful, who are dizzy-headed, or who are easily rattled should never do climbing. This method is considered safer and better on trees of small to medium diameter than that using climbing irons and belt. There is no buckled equipment or extra weight to catch, trip, or burden the climber. The measurements taken on the tip and in the top are not as hazardous as they appear. All remaining measurements are taken from a sitting position where the workman is under no strain. This method is considered preferable on hardwoods to other methods using climbing irons because the latter are less suited to hardwoods than to conifers or soft peeled poles. Furthermore, climbing irons are objectionable because they injure the bark of the trees.

Proof of these claims lies in the measurement of 794 trees without a single slip or fall. The value of this method is further established by its use in tree surgery.

Costs

Without question, this method of securing stem measurements is more costly than that of using cut timber. Although advantage was taken of every opportunity to secure measurements of suitable cut or windthrown trees, by far the largest part of the data had to be secured by climbing.

Of the special equipment needed for the task, most of it can be used repeatedly and on other work. Rope is strong and safe for one summer. The wear in the slip knot

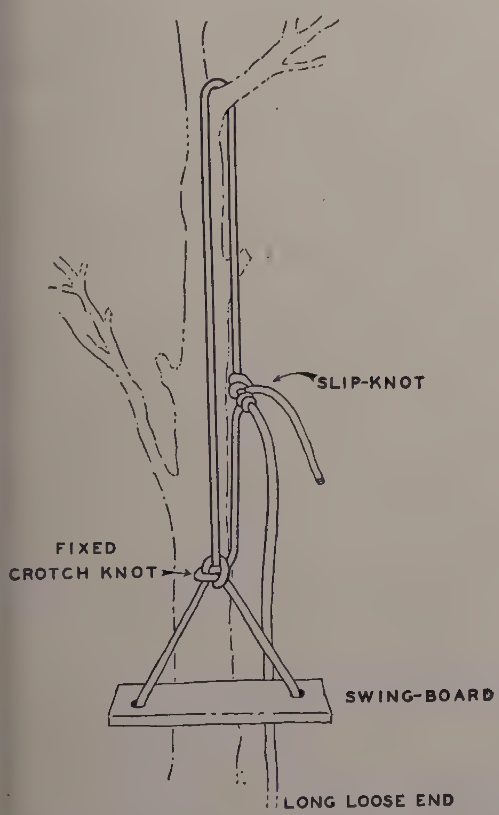

Fig. 1.—Details of the crotch knot at the swing-board and use of the 30-inch end for tying the slip-knot.

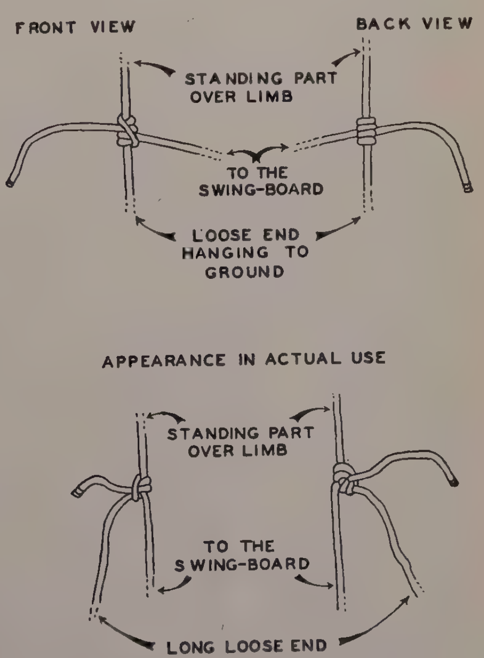

Fig. 2.—Details of tying the slip-knot.

is such that it is advisable to reverse the rope end for end about once during the field season, and purchase a new rope for a new study. The safety belt and strap ($14.20), extension ladder ($12.00), swing-board (50 cents), and iron brackets for carrying the latter ($6.50) have indefinite use and are consequently subject to a depreciation charge of 10 per cent.

The daily output of completed measurements is lower by this method than where cuttings are available. There are several reasons for this. The process of climbing is quite fatiguing at best, especially in hot weather. The smaller black locust trees were found to be particularly prickly and therefore difficult to measure. The number of trees measured at one place is limited; and this restriction may cause loss of time for portions of work days. Travel cuts down the effective time actually spent on taking measurements. Finally, since plantation trees are small-sized and suitable principally for piece products, the number of measurements which are taken is greater in proportion than on large mature timber. In the case of black walnut, the log length was 12.3 feet instead of the standard 16.3 feet of large western coniferous timber. In the case of black locust, posts are of particular importance and measurements were taken every 7 feet in order to secure accurate data on post contents. For the black locust study, the analysis of time is given in Table 1:

TABLE 1

DISTRIBUTION OF TIME—CLIMBING CREW—1932

Activity	Days	Per cent
Climbing	47.3	64.0
Travel	8.7	11.7
Sundays and holidays	13.1	17.7
Rainy weather	4.9	6.6
Total	74.0	100.0

Only 64 per cent of the time (Table 1) were days devoted to taking the measurements. On this basis, the average daily number of trees climbed was 8.3.

The size of the trees is an important factor in its bearing on daily output of completed stems. As might be expected, the output is relatively large for short trees and declines rapidly as the trees increase in height. On the average (Table 2), 15 locusts in the 10-foot class were measured in a day, but only about 8 trees 50 feet high and about 5 if 90 feet high.

TABLE 2

RELATION OF TREES CLIMBED DAILY TO TOTAL HEIGHT OF TREES

Total height class	Trees climbed per day (Approximate)	Total height class	Trees climbed per day (Approximate)
Feet	Number	Feet	Number
10	15	60	7
20	13	70	6
30	11	80	5½
40	9	90	5
50	8		

Larger output of completed stems can be secured with this method where the study at hand can be concentrated on a given stand or group of stands. Where the travel item (11.7 per cent) and Sundays can be reduced to a minimum and rainy weather utilized on other work (as by permanent, trained personnel), so that more time can be spent on productive work, the output should be raised by almost half again. On a study of scattered plantations, maximum output could not be realized; but under favorable circumstances, 22-23 trees of the 10-foot class, 12 trees 50 feet high and 7-8 trees of the 90-foot class should be completed in a day.

RUBBER FORESTERS

By J. S. Barnes

Soil Erosion Service, Department of Interior

WHEN American automobile tire manufacturers decided to get into the production of crude rubber in a big way, it opened up a new field that the technically trained forester was well qualified to fill and a number joined the staffs of the rubber plantations. Personnel turnover in tropical enterprises is very high and until the recent world-wide economic upset there were occasional openings for foresters who desired to go into such work. It is quite possible, that with the return of a more normal economic situation, there will again be an occasional call for a forester to join the plantations. It is the purpose of this paper to point out a few of the factors that should be considered by those who may be contemplating such a position.

First, it is essential to keep in mind that there are but four American rubber companies of sufficient size to justify a forester's seeking a position on their staffs. Two of these are in Sumarta, one in Liberia, and one in Brazil. The field is therefore very limited and most openings come about through normal staff turnover and through expansion policies of the different companies. The writer is only familiar with conditions as they exist in Sumatra in the Dutch East Indies.

Forestry students often inquire as to the studies that they should pursue in college in order to prepare themselves for work on the rubber plantations. To answer such an inquiry I wish to present the situation from the plantation viewpoint. Let us assume that the manager wishes a forester to fit into an existing staff—administrative or research or a combination of both. If there is a suitable man, with tropical experience, available he is by far the best choice because he has shown that he is suitable by temperament and health to tropical conditions. There are very few such men available, so it is usually necessary to bring one from the United States. The particular job to be filled will determine the type of man wanted but his ultimate selection will be on a somewhat different basis than would be the case in this country. The job will require technical ability which may well be the least important factor to be considered. He must have good physical health and mental stamina and a coöperative personality that will adjust itself harmoniously with the other members of the staff, American and European. The ability to readjust one's life to a new environment and become an asset to the organization is of first importance. Off-hand, this may appear easy but after the novelty of the place has worn off, and day follows identical day in the same surroundings, with the same small group of people with whom to work and play, and all living under hothouse conditions, hemmed in by walls of eternal green which may be either a tropical paradise or a "green hell," according to the point of view; with the ever-present necessity for care in eating and drinking (especially the latter) and the constant battle against the little bugs and fungi which find their heaven on a white man's skin; to hear the constant recital of the lucky ones counting the months until the homeward bound boat will bear them away from this place where people wish their lives away;—to maintain a stable mental equilibrium and turn out a fair amount of good work under these conditions is not easy.

The choice of a new man is thus a matter of more than just his technical

ability or scholarship. Personal knowledge of a man is highly desirable and few men are chosen who have not been personally interviewed by some member of the staff familiar with the plantations. In the case of filling a place on a research staff the type of training is of greater importance as, in addition to the other qualifications, the man should have proved his research ability. It is not expected that one will be found who has done rubber research nor is this necessary. If it is desired to get a man to work on the diseases of rubber trees, the applications of plant pathologists will be sought and the one who appears to best fill the needs of the company, will be selected. The same would be done in the case of any other specialist. Most employers feel that if a man shows ability in the field in which they wish him to work he can apply that ability to the problems of rubber culture without difficulty and will soon get the practical knowledge of Hevea brasiliensis by daily contact with a going plantation.

A general forestry training gives a good background for a plantation field man. The major field activities are about as follows:

1. Jungle exploration—in some cases
2. Surveying and mapping
3. Jungle clearing
4. Seed collecting
5. Nursery practices, including budding
6. Planting and replanting
7. Thinnings
8. Yield studies and records
9. Tapping
10. Disease control
11. Soil conservation practices
12. Fertilizing and cover crops
13. Cost records and estate management.

It will be seen that a forestry training gives some fundamental knowledge applicable to all of these activities. The student who hopes to get a job on a rubber estate later on will need a thorough grounding in silviculture but in just what branch of forestry he specializes will probably be of minor importance. A knowledge of plant physiology is essential but the average forest school course furnishes this and if a man does not have the knowledge he can soon acquire it.

It does not appear desirable for a student to aim his courses particularly toward a position with a rubber company. The chances that there will be a desirable opening, when he is ready for the job, are rather remote unless he has outside influence. Also, one never knows whether it will appear desirable to spend more than one term in the tropics until the trial has been made and all factors considered.

One of the main problems to be considered is that of getting back into ones own profession at the end of a term in the tropics. Plantation records show that a very large proportion of Americans remain there only one term. Hence a man should consider the probability of having to re-establish himself within four or five years. It is a pure gamble of course as such factors as economic conditions, and particularly forestry conditions, cannot be foreseen. Some people consider that the time a man has spent in the tropics is wasted as far as the forestry profession is concerned and will not consider him for their staffs. Fortunately, there are probably an equal number, or more, who consider that the opportunities a rubber plantation affords for the intensive practice of silviculture, may be of greater value for a limited period, than the work that might have been done at home. In general, the longer a man stays on the plantations the more difficult it will be for him to get back into his profession at home. It is generally conceded that if a man

stays more than one term he ought to stay long enough to enable him to gain a living competence for his later years. It was formerly considered to take about seventeen years to do this.

Health and living conditions are probably the questions uppermost in the minds of those considering tropical work. Living conditions are very good in Sumatra and the maintenance of health depends, in all tropical countries, on the exercise of eternal care in eating and drinking. Where brown and yellow skins predominate the only safe rule is to dring only boiled water and eat only peeled or cooked fruits and vegetables. Such precautions are soon taken as a matter of course and do not constitute a hardship. The tropical climate enervates one gradually and resistance and vitality are lowered to some extent. It is probable that these factors have been somewhat over-drawn. High-strung, nervous people should stay away from the tropics for as a general rule they do not "wear well" and the monotony of life often causes nervous disorders. On the other hand, the more stolid type of individual, who goes his way with a large measure of disregard for the physical and mental annoyances of the tropics, will get along well in hot countries.

The married man should consider the effect of the living conditions on his wife. Life is, paradoxically, very easy and very hard on white women. With plenty of native servants her domestic duties are very light but the question of spending her time is thereby increased. The tropics are not particularly favorable for rearing families and the young woman with nothing to do, and three years in which to do it, is a subject for serious thought. She will have few woman companions and reading, sleeping and bridge, when taken as a steady diet, are not conductive to the fullest or happiest life.

Let us consider motives that induce a young man to go to the plantations, and to what extent such a position will fulfill his desires. Motives are usually more or less complex and include such items as higher pay, the opportunity to travel and see the world and a chance to satisfy the explorative instinct. Pay should be considerably more than can be made at home because of the short time that a white man usually stays in the tropics and the loss of time in getting re-established at home. A general rule is that anything less than double what one can make at home is not worth while, financially. The desire to travel will be fulfilled by a trip around and the homeward voyage can be about as protracted as finances permit. The exploration of tropical jungles will probably not be carried on very extensively as the routine of plantation duties leaves but little time for indulging in Frank Buck episodes. Monkeys and wild pigs are common but the more spectacular animals such as tagers, elephants, rhinocerus, etc. are seldom seen and their hunting requires specially planned expeditions into remote country. A python or crocodile skin can be bought from a native for a few guilders and it will be nicely tanned.

When times are prosperous the plantations may offer some very attractive contracts which are a real inducement to the average forester. As soon as the decline sets in, however, the situation changes rapidly with contracts being terminated and men sent home on short notice. Contracts given out during depression times offer little financial inducement and plantation morale is apt to be at such a low ebb as to make the entire staff dissatisfied.

During good times the young forester who is not yet well-established at home, may find it advantageous to spend a term on the plantations, and very likely will never regret it. For the older man, who is established, to pull up and leave may prove unfortunate.

FORESTRY: IS STATE MONOPOLY NECESSARY OR DESIRABLE?

By P. Z. CAVERHILL

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This article is characteristic of many writings of a philosophical nature. The writer, as a result of his experiences and thinking, reaches certain conclusions. These he submits as assertions to the reader without permitting even a glimpse of the knowledge and reasoning behind them. It is very nice to write, for instance, "Private forest enterprise marching hand in hand with public ownership will have a stabilizing influence." The critical thinking reader (and I hope the JOURNAL readers do not blindly accept the printed word) will immediately ask, "What is this stabilizing influence found only in private ownership? How, when, and where is it applied?" They will look in vain for the answer and then, if in haste, will with praiseworthy caution reject the statement as not supported by evidence, or, if time permits, they will sit in judgment submitting and analyzing only their own available evidence without assistance from the author.

Many a politician, too, will be envious of Caverhill's language in deploring the public burden on an "overtaxed people" and they will admire his calm demand further on in the article for an increase in public services along many lines. Such services, of course, will have to be paid for and that will mean more taxes!—P. A. HERBERT, *Associate Editor.*

IN a democratic state the government is not a thing apart from the people, but is the essence of *vox populi,* and the representatives in parliament are but ordinary, everyday citizens. Their works are financed by funds generally unwillingly extracted from Mr. Average Citizen, and we have a growing indication that Mr. Citizen is scrutinizing more critically how these funds shall be invested.

Seriously then, wherein is this organization called government better equipped or qualified to undertake forest ownership and forest production than a private individual? Is it in stability of policy? Administrations come and go, and often policies with them. Who would have thought two years ago that such radical changes as are embodied in the N.R.A. were possible, or who can predict what the fate of the N.R.A. will be two years hence? It is true that governments represent wider interests, but here again that very fact may prevent the close consideration of individual undertakings which they would receive under an ordinary board of directors.

Is the government better equipped and more capable of conducting business? Our socialistic friends may answer Aye, but experience has all been otherwise, and no business that I can conceive of needs greater foresight, greater care in investments, and greater economy in expenditures, than forestry. Employment conditions in government services at large are such that they do not attract and retain the most skilled and able employees. I have seen too much of the drift to private employment to be conceited on this point. Wherein, then, is the basis for government monopoly? Wherein is the reason for assuming that this phase of American industry can only be taken up as a state enterprise?

The essentials of a forest policy appear to be: (1) a reasonable outlook and faith in the future; (2) a continuity of purpose and stability of policy; (3) ordinary business acumen applied to the forestry problems; and (4) reasonable financial arrangements. There is nothing in these requirements which would place forestry in a category impossible for private enterprise.

A reasonable outlook and faith in the

future—While the per capita consumption has declined and the timber famine cry acted like a boomerang, all indications are that modern civilization requires and will require a wood supply, and that the per capita consumption will eventually stabilize, probably somewhere around 200 board feet. The increasing imports in many markets and the freight charges paid in connection therewith give assurance that in areas adjacent thereto, at least, a market is assured. The development works of Jim Hill, Shaughnessy and Rhodes were built on a less secure foundation.

Continuity of purpose and stability of policy—Here again the requirements are not contrary to established business principles. The foundations of many of our great industrial houses was laid generations ago. In forestry Stora Kopparberg Bergslags Akliebolag, Sweden, is a classical example, and in America the foundations now being laid by the Great Southern Lumber Company, the Dierks Lumber and Coal Company and others may be of equal importance. The exigencies of time may, it is true, modify these schemes, but governments are subject to the same influences of time and change.

Private forest enterprise marching hand in hand with public ownership will have a stabilizing influence, and, when all the ballyhoo and sentiment are evaporated from conservation, when it is no longer possible to live off capital and we get down to the bedrock of supplying a nation's needs from our own resources and by our own ingenuity, it will help the one class to understand the problems of and support the other,—an understanding all too lacking at present. The reforestation schemes of the United Kingdom and New Zealand attained their present magnitude only by such coöperation, and many European precedents could be cited in support of this contention. The wider the distribution of ownership, the better and stronger will be the national foundation for forestry.

Business acumen applied to forestry—If we concede that there is a forestry problem and that supplying our needs with a vital commodity is a business in whole or in part, then why are the same principles that have built up other business enterprises not applicable? And, if we see little or no hope of success, for how long can we expect, through ballyhoo and sentiment, to secure government appropriations extracted from an over-taxed people?

In other undertakings, long-term investments are made with little expectation of immediate return. We pride ourselves in that America was developed by private enterprise, and that governments are unsuited for and should not enter into competition with such enterprise. This attitude of mind needs careful consideration by those who advocate wholesale state ownership. The practice of silviculture and logging is a continuous operation. The practice of silviculture for maintaining crop values and of logging for the maximum profit are incompatible, and it seems to me that one must concede that, if it is the function of the state to grow timber, it is also its function to log and thus bring its operation to fruition. This stand has been demonstrated time and time again in European forest history.

Definitions such as Richards' "Free forestry" (JOURNAL OF FORESTRY 31; pp. 279-285), are mere red herrings across the trail, part of the passing-the-buck tactics which we have indulged in all too frequently. There is no such freedom in any line of human activity. We begin life with mothers, "Baby must not do this or that," and until the hour of demise we are hedged around with restrictions legal or social. The tendency of the time is to increase rather than diminish such restraints.

There is a generally accepted principle, "Ownership involves responsibility." The owner of property must not allow that property to become a public nuisance and, if he does, must take steps to abate

the nuisance. Forest land allowed to become waste is in essence a public detriment and nuisance, and herein lies the main difference in the approach to the forestry problem in Europe vs. America. In Europe they accept the principle that forest land must be maintained in a productive state, and I am unable to see wherein American forestry under private ownership needs further restrictions.

Financial arrangements—It is in our mental attitude towards finance that the greatest handicap to forestry is encountered. This is a hangover of the glorious spree of rapid liquidation of the past century. Most of our forest laws and thought have developed concerning vast stands of mature timber of a new country and the get-rich-quick opportunities offered therein. The above condition culminated in war profiteering and post-war inflation (and in this I do not exempt the average citizen; the laborer who accepted his $10 to $12 per day for manufacturing war materials was, in his own sphere, a profiteer). I suspect that a large part of our present financial difficulties can be traced to attempting to collect 5 or 7 per cent interest on the excessive credits then set up, and trying to maintain a standard of living on that scale.

The earning power of money over long periods is not high and probably does not exceed 2 or 2½ per cent. The increase in national wealth, even of the most progressive nations, does not compound at higher rates (JOURNAL OF FORESTRY, Volume 32: 236). These recurring losses go a long way to offset the high rates received during temporary periods of prosperity. One only needs to compound at 5 or 6 per cent a small investment for three or four hundred years to reach absurdity.

The European in general, brought up in a different school, having received many hard knocks through deflation and confiscation, is content with lower rates and security. In the forest he has something concrete, something that will give him and his heirs some income, even if small, and this is more important than immediate gains, which in all probability would be invested and lost in the next stock gamble. I admit that the changing of the viewpoint in America is a large undertaking, but the 2 per cent annual growth increment is a concrete item. It is at least realizable in wooden dollars, and therein may be more profitable than 5 per cent paid in the rubber or managed currency of the moment. Herein lies an opportunity for foresters to approach the industry in respect to private forestry because: (1) it offers concrete and stable dividends; (2) with the increasing income tax, a large part of income only passes through our hands; (3) the saving on income taxation and depletion charges will often go a long way to bridge the gap between a temporary and a sustained yield operation.

The foregoing is an argument largely against state ownership, yet I believe the state has a definite place in the picture and that state activities should be increased rather than diminished. These activities should be along the following lines:

Forest fires are caused to a large extent by the public, and their control should be to an equal extent a state function. The property owner should be given protection in this regard the same as we protect other classes of property owners through police from public depredations.

Tax laws devised for revenue-producing property are in general not applicable to forests, where revenue is not secured yearly. Such laws force liquidation and abandonment of frozen assets, to the detriment of both the state and the owner. Such laws should receive careful consideration and revision to a point where they do not become confiscatory in character.

Transportation is vital to any perma

nent forest policy. State and federal assistance is granted to other industries in supplying permanent transportation. Similar assistance should be granted to forest owners. Once an area is developed with permanent roads, a long step will have been taken to ensure the owner of the maximum revenue and sustained production, and also to ensure the state of a permanent income therefrom.

The state should carry on the research necessary, both in forest products and silviculture, giving to the forest owner the basic information for forest management, in the same way in which it undertakes agricultural research, and including demonstration forests which will act as educational guides to private owners.

The state should acquire, control and develop areas required for watershed protection, erosion prevention, and recreation, where timber production is not the primary objective, and the state will probably be forced to take over and manage marginal lands.

The field of forestry has scarcely been broken. It is still infested with holes and clods. Instead of disputing as to who shall be the gardener, let the profession show us how each can hoe his individual row and by such coöperation bring that garden into splendid fruition.

I may say that the work of a forest officer in India is, especially for a naturalist, one of the pleasantest careers that a young man can take up. The work is very largely out-of-door, and though of course there are some charges in unhealthy regions, and in some regions they are much exposed to heat or wet and the chances of illness, most forest officers get their turn of service in the hills at some period of their time. The improvement in communications in India, and especially the construction of railways, has largely done away with the old chances of a solitary life, so that, at the present time a forest officer gets as much opportunity for social life as officers in other services; while, when out at work, good forest roads, good shelter-houses, and a regulated management of the forests, make work easier than it used to be thirty years ago.—*The Forests of India* by J. S. GAMBLE, ESQ., 1903.

APPLICATION OF ECONOMIC SELECTION TO LOGGING OPERATIONS IN THE DOUGLAS FIR REGION

By C. A. LYFORD

Western Manager, James D. Lacey & Company

The importance of economic selection in logging has been accentuated by the silvicultural requirements under Article X of the Lumber Code. As a vehicle for progress toward silvicultural objectives, economic selection has the merit of offering a chance to reach a long way toward such objectives without addition to current operating cost. The following article, although limited to the economic aspects of selection in logging, offers guidance toward a properly balanced combination of economic and silvicultural objectives for the Douglas fir region. The writer is a graduate of the Cornell College of Forestry and of the Yale Forest School. For the past 17 years he has been Western Manager of James D. Lacey & Co.

IN THE selection of areas for logging the Douglas fir logger has always been guided by economic factors. In the selection of trees and logs this economic guidance has generally led to the use of fixed diameter limits arbitrarily chosen and uniformly applied over large areas. Further refinement in applying this principle of economic selection is generally considered in theory but difficult and dangerous in application.

Every logger knows that a small log costs more per M[1] to handle than a big log, that a log near the loading point costs less than a log far away, that a defective log costs in proportion to gross scale and sells in proportion to net scale, that a clear butt sells at a higher price per M than a rough top. He knows that the cost per M of spur construction and rigging ahead varies from setting to setting with ground difficulties and density of stand. He also knows that the combination of all these widely varying items into grand average costs and grand average selling prices gives a grand average stumpage conversion, and that this grand average stumpage conversion is based upon an aggregate of separable items varying so widely that many of them are bound to fall below zero. He knows all this and yet he hesitates to attempt the elimination of these minus items. He has had experience trying to eliminate cull logs from his input and found that such efforts commonly result in leaving behind more plus value than minus value. He will move slowly toward application of economic selection and make no important changes in operating practice without proving his way step by step.

The first step will be reclassification of logging costs with economic selection in mind. Such a reclassification will be somewhat as follows:

Current Operating Expense

Group 1. Fixed per acre per setting
- Spur construction
- Rigging ahead
- Engineering
- Industrial Insurance (pro-rated)
- Group total

Group 2. Variable per M with tree size
- Felling and bucking

Group 3. Variable per M with rate of input
- Yarding and loading
- Train operation on spurs
- Speeder operation
- Maintenance mainline

[1]M signifies 1000 feet board measure.

Maintenance spurs
Maintenance logging equipment
Wire rope and rigging
Fuel
Sundry supplies
Foreman and clerks
Camp office expense
Scaling
Fire protection (operating)
Industrial Insurance (pro-rated)
Insurance of logs
Uninsured operating risks
Interest on liquid working capital
Group total (Less transfer to Group 1 of an allowance to cover any reduction of log input by line changing).

Group 4. Variable per M with carload volume
Train operation mainline
Log freights
Maintenance railroad and rafting equipment
Unloading
Rafting
Towing
Industrial Insurance (pro-rated)
Group total

FIXED OPERATING CHARGES

Currently Payable

Group 5. General expense
Taxes on equipment and improvements
Insurance of equipment and improvements
Maintenance of camp buildings
Fire protection (non-operating)
Supervision
Association dues
Sundry general expense
Group total

Return of Capital Advances

Group 6. Amortization of improvements and equipment
Amortization of mainline and terminal improvements
Amortization of railroad equipment
Amortization of logging equipment
Group total

Timber Supply

Depletion=return of timber investment including taxes and protection
Stumpage=timber purchase price per M on pay-as-cut basis
(Grand total) ± (Mill pond value or net log market value) = (Profit or loss)
Stumpage conversion = (Depletion or stumpage) ± (Profit or loss)

Current operating expense is intended to include those costs which result directly from current operation and which can be discontinued by shut-down. Fixed operating charges, on the contrary, include those costs which can not be discontinued by shut-down. The item of supervision, for example, is intended to cover the cost of carrying managerial personnel over shut-down periods.

Owing to the prevailing abnormal conditions, discussion of the above specified cost groups can best be based upon an assumed log market level and the costs normally corresponding to it. We will accordingly assume \$8-\$12-\$16 for the three grades of fir logs, \$8-\$10 for the two grades of hemlock logs and \$10 for cedar shingle logs.

Group 1.—This group, together with Group 2, includes that portion of current operating expense incurred before log transportation starts. The cost of spur construction and rigging ahead is water over the dam as regards log selection in yarding and can be taken into account selectively only by budgeting in advance and eliminating minus areas in units of settings. It is controlled per M by ground conditions and density of stand and commonly varies from less than 50c to over \$4.00 per M from one setting to another.

Group 2.—The cost of felling and bucking shows a consistent variation per M with size of tree. Even with labor paid on a per M basis the higher cost for smaller trees adds to the price per M

which must be paid to meet the average time rate of pay required to keep the fallers and buckers on the job. Time studies indicate that for Douglas fir the combined labor cost of felling, bucking, limbing and marking is fairly uniform per M for trees over 36 inches in diameter breast-high outside bark, but slants upward at an accelerating rate for smaller trees, a 27-inch tree showing 25 per cent above the combined average for all sizes, a 23-inch tree 50 per cent above, and a 19-inch tree 100 per cent above. For hemlock a 20-inch tree shows 25 per cent above the combined average, an 18-inch tree 50 per cent above and a 15-inch tree 100 per cent above.

The felling and bucking cost variable affects only a small proportion of current operating expense and is accordingly a minor factor in selection. It does, however, commonly add 50c-$1.00 per M to the cost burden against many smaller trees which might otherwise pay their way.

Group 3.—This group is intended to cover that portion of the current cost of transporting logs from stump to market or mill which is not materially changed in total amount by fluctuations in the rate of log flow measured in M feet. It accordingly varies per M inversely as the volume rate of input.

Wide variation in rate of log flow is characteristic of current logging practice. This variation has been reduced somewhat by shortening yarding reach and by cold-decking and can be further reduced by using tractors for yarding where conditions permit. The influence of log size and distance from loading point on rate of log flow will, however, continue as constant controls.

The rate of log flow is generally set by the yarding or swinging crews, with loading and rail transportation designed to handle the maximum rate of yarding flow. When the yarding input overruns the loading capacity, as it commonly does at short yarding distance, the loading crew becomes the pace setter. It is therefore necessary to measure the influence of log size on yarding flow, swinging flow and loading flow, and of yarding distance on yarding flow.

The Pacific Northwest Forest Experiment Station has made time analyses of thirty different yarding and swinging operations and thirteen loading operations. These studies cover all types of machinery in common use and representative variations in type of timber and topography. They include interlocking skidders, slack-line yarders, heavy high-lead yarders (steam and electric), medium high-lead yarders (gasoline and Diesel), light gasoline yarders and crawler tractor yarding; swinging by North Bend system, Tyler system, interlocking skidder, slack-line yarder and high-lead yarder; and loading by heeling boom, McLean boom, duplex loader and jammer. This data is thoroughly detailed and complete and has been compiled separately for each operation into tables and charts showing the measured influence of log size and yarding distance upon hauling time, haul-back time, hooking time, unhooking time and total yarding or swinging time; and the influence of log size upon loading time.

The curves showing the relation between log size and yarding time per M are strikingly uniform in shape for all types of machinery and yarding shows. Starting with the largest sizes they all rise slowly for a long stretch and then break sharply upward through the small sizes to approach the vertical at log size 100 feet. When replotted as ratios of the time per M for each log size to average time per M for all log sizes combined, all but the tractor yarding curve show a strong tendency to draw together into a standard curve representing a basic relationship between log size and yarding time per M for all types of stationary yarding equip-

ment. The lighter yarders depart somewhat from this standard curve by reason of the influence of power shortage on hauling time in handling heavy logs, this departure being more pronounced on uphill pulls and tending to disappear on down-hill pulls. The tractor yarding curve departs still further, showing comparatively less handicap against the smaller log sizes.

This standard ratio curve indicates that, for a combined log average of 1,000 feet, the time per M, and correspondingly the cost per M for Group 3, for yarding, swinging or loading a 400-foot log is about 2.2 times the average cost per M for all sizes combined; for a 300-foot log about 3 times; for a 200-foot log about 4.5 times and for a 100-foot log about 8 times. For tractor yarding the corresponding handicap against a 400-foot log is about 1.6 times, a 300-foot log 2 times, a 200-foot log 2.8 times and a 100-foot log 5.3 times. For a smaller average log size these ratios are lower but this is offset to a varying extent by a higher average cost.

The ratio curves for loading all conform closely to the standard curve for high powered yarding equipment. For swinging, however, this conformity is limited to logs averaging large in size. A full use of multiple turns in swinging small logs permits approach to the ratio curve for tractor yarding.

These ratios can not, of course, be expected to fit exactly any particular operation. In fact, the actual ratios can sometimes be materially modified by slight changes in operating procedure. They do, however, give a fairly close measure of expectation for an operation which has not been critically analyzed and adjusted.

Yarding distance is an additional factor controlling the rate of log flow for the operation as a whole except when the yarding flow is held below capacity by limitations in swinging or loading, in which case its influence disappears. For interlocking skidders and slack-line yarders the relationship is uniform and does not vary widely from one machine to another. For high-lead yarders the relationship shows an acceleration with increase of distance (due to increase in time lost by hang-ups) and varies widely from one operation to another. Expressed in relation to the yarding time for average distance, the skidders and slack-line machines show 20-30 per cent greater for the outer reaches and 20-30 per cent less near the loading point. For high-lead yarders, the corresponding ratios are 30-100 per cent greater for the outer reaches and 30-60 per cent less near the loading point, the swing of variations with distance tending to increase from a minimum for heavy yarders with short external yarding distance to a maximum for light gasoline yarders. For tractor yarding the relationship is uniform, with the ratio to yarding time for average distance increasing with external distance, being about 40 per cent greater for an external distance of 2,000 feet and about 50 per cent greater for an external distance of 3,000 feet.

The effect on log flow of yarding distance and log size combined is a multiplying one. For example, a log handicapped 50 per cent above the average by distance and 300 per cent above the average by size has a combined handicap rating it six times the average (150 per cent $\times$ 400 per cent — 600 per cent).

All these ratios will apply to group cost averages commonly ranging from \$1.50 to \$3.50 per M.

Group 4.—This group is intended to cover that portion of the current cost of transporting logs from stump to market or mill which tends to vary per M in accordance with log scale per carload. The item of log freights, when payable at a flat rate per car regardless of load size,

fits this relation exactly. The other items, except towing, cover log transportation service normally maintained at sufficient capacity to handle the peaks of yarding input. They are accordingly controlled per M to some extent, sometimes to a large extent, by the rate of log flow controlling Group 3. The cost per M of towing deep rafts follows closely the carload variable. For flat rafts the towing cost tends to vary with cubic volume per board foot log scale, laying less handicap against the smaller logs. For adverse grades against loaded cars the cost of train operation increases per car with weight of load, although the effect per M is modified by increase in board feet per ton for larger logs and decrease in rolling resistance per ton for heavier loads. The combined effect of all these variables will generally give a curve of relationship between log size and cost per M similar in shape to the curves for the yarding variable and carload variable and intermediate in position.

Ten separate studies of the relation of carload volume to log size show that although the absolute carload volume for a given log size varies widely from one operation to another, the relative carload volume for one log size compared with another tends to follow a constant relationship. Expressed in ratios to a combined log average of 1,000 feet, this standard curve indicates that the cost per M for a 400-foot log is about 1.5 times the average, for a 300-foot log 1.9 times, for a 200-foot log 2.7 times and for a 100-foot log 4.6 times. These studies also indicate that increased efficiency in loading to capacity tends to reduce slightly the handicap against the smaller logs, maximum efficiency reducing the above ratios to 1.4 for a 400-foot log, 1.7 for a 300-foot log, 2.4 for a 200-foot log and 4.4 for a 100-foot log. Allowing for the tendency of some of the cost items under this group to follow the ratio curve for Group 3, the Group 4 curve will generally show ratios running about 1.6 for a 400-foot log, 2.0 for a 300-foot log, 3.0 for a 200-foot log and 5.0 for a 100-foot log, these ratios applying to group cost averages commonly ranging from $1.00 to $4.00 per M.

Group 5.—This group includes expenses currently payable which can not be discontinued by shut-down. They are fixed in total amount against a variable log flow and, for an operation within reach of open and ample log markets, are controlled per M by the rate of log flow in the same way as the costs under Group 3. For an operation which can reach market only through a specific mill or mills, this group of costs is controlled per M by milling and lumber selling performance. If such an operation is deficient in log storage capacity, the resulting temporary logging shut-downs will add somewhat to this fixed expense. The group total will commonly range from 30-50c per M.

Group 6.—This group includes charges intended to represent the return of capital advances. These advances can be taken into account selectively only before they are made. They have no after effect on log selection or area selection. In fact, they have little economic after effect of any kind. The market price of logs or lumber produced is, except during market upswings, controlled by marginal producers selling at prices barely sufficient, or less than sufficient, to cover current cash expenditure. Amortization charges, when realized in cash, are essentially a portion of the stumpage conversion resulting from differential operating advantage over the marginal producer. Their realization is not controlled by the existence of the capital advances against which they are applied. This lack of economic protection for capital advances applies with extra force against advances for large and long-lived units of equipment subject to obsolescence.

The cost of currently replacing short-lived items of equipment belongs under current operating expense. The cost of the original set-up of such equipment is a capital advance subject to such amortization as can be realized.

The system of cost classification outlined above gives no place to interest on loan of funds applied to capital advances for improvements and equipment or for purchase of standing timber. Such interest payments are subject to amortization and depletion along with the principal of such capital advances. Interest on liquid working capital is, however, included under Group 3.

Log value.—All the above deals only with operating cost. In rating logs for selection, however, selling value must also be taken into account. In area selection a value rating for all log sizes is required. In log selection only the smaller sizes (generally those scaling less than 500 feet) depart sufficiently from average cost to require rating. Defective logs present a special problem which will be treated later.

If based on log market, value rating is comparatively simple. Top logs consistently rate No. 3. Small butt logs generally rate No. 2. Setting areas are rated on estimated log grade percentages for each species. If based on pond value at mill, log value rating requires mill tests sufficient to determine, for each size and type of log concerned, the selling value of lumber produced and the specific cost of producing it.

From the few mill tests which have been made, it is already notable that they show a wide variation from mill to mill in cost of manufacturing and in lumber value produced from logs of given sizes and types. This variation is partly due to differences in management, but is largely due to the fact that certain mills, by virtue of their physical arrangement, mechanical equipment and market connections, are decidedly superior to other mills in converting certain sizes and types of logs. For a producing region with a common water market for logs, this permits a special kind of economic selection which relieves the loggers and millmen, as a coördinated group, from a part of the burden which the wide diversity of raw material lays upon the mill which must manufacture, or ship by rail without sorting, whatever logs the forest may yield. From the standpoint of the log producer, careful attention to this kind of selection is of high importance.

Defective logs.—Reduction of scale by log defects is an important factor in selection. Current practice in this regard, however, will be hard to improve, chiefly because appraisal of defect before yarding is difficult and uncertain. The guiding principle is simple, cost being rated on gross scale, selling value on net scale.

Operating budgets.—A full measure of economic selection will require budgeting the operation. Alternative projections of log hauling routes and yarding settings will be figured to determine area selection and the most economic sequence of cutting.

Determination of the most economic sequence of cutting will require rating of settings with reference to economic maturity. Owing to the fact that the manufacture of standing timber requires heavy capital advances against future operating charges, positive stumpage value develops in operating units of area rather than in independent units of trees or logs. A positive setting with a large proportion of its merchantable wood volume negatively rated tends to increase in value not only by reason of the upward trend of the volume already positive, but also by reason of the continual shift of volume from negative to positive. Such a setting is generally increasing in value at a rate more than sufficient to cover interest and other carrying charges and can profitably be held for future cutting. A setting with a

large proportion of positive wood volume and a current conversion value of over $3.00 per M is, on the other hand, economically overmature and should be given preference in cutting in proportion to its excess of conversion value.

In rating a setting, the following will be required:

1. Estimate of the amount of timber on the setting down to and including the smallest log sizes offering a chance of plus conversion. Classification by species and log size, with smaller log sizes in 100-foot groups and larger log sizes grouped together. Log grade classification for each size group. This estimate will serve its purpose without great accuracy of detail and can be sufficiently approximated without burdensome expense.

2. Estimate of operating cost for the setting, classified according to cost groups as specified above, with Group 1 as a lump sum and Groups 2 to 5 as averages per M for the log sizes included in the estimate. Current segregation of costs and log yield by settings will provide a sound basis for estimating setting costs in advance.

3. Determination of cost ratio curves for log size and yarding distance.

4. Market price or mill pond value, by species and log grades.

After making the eliminations indicated by applying the above specified cost ratios and selling values to the various segregations of the timber estimate, the remaining timber will be refigured as to cost per M under Groups 3 to 5, Groups 1 and 2 will be added and the combined cost matched against the selling value to give final rating for the setting. Rerating can readily be figured if required by changes in costs or selling prices.

Actual operative elimination of negative wood material from a positive setting can best be assured by applying selective choice in conjunction with felling and bucking, leaving unbucked any material negatively rated. Selective attention from the yarding crew will then be required only for logs negatively rated by reason of defect.

In applying selective choice before felling, some of the smaller trees with one positive log and one or more negative logs will be rated negative because the small positive value will not cover the cost of felling and bucking.

When logs are yarded two or more to the turn, it may be questioned whether some of these small negative logs would not get a free ride in turns paid for by larger logs. If no positive log were available for substitution, such a free ride could be had, although it would not extend beyond delivery at loading point and would not be free when the rate of yarding input exceeded loading capacity. It is doubtful, however, whether the gain from these occasional free rides would offset the loss from felling and bucking the negative logs left behind.

Adaption of logging methods.—Where economic selection excludes a large proportion of the standing trees, its application will interfere with those yarding operations using equipment which requires a clean sweep of the standing timber for shifting lines. This difficulty can be partly met by more extensive use of small cold-decking machines and, where ground conditions permit, can be wholly met by use of crawler tractors for yarding. Changing to tractor yarding would also materially reduce the handicap against the smaller log.

An indication of the extent to which economic selection may affect current logging practice can be derived by analysis of log scale returns from typical settings. Such an analysis of a setting with an average log yield of 55 M feet per acre and an average log size of 610 feet, shows that, of the total log scale removed, the 100-foot log size group embraced 2 per cent, the 200-foot group 5 per cent, the

300-foot group 6 per cent, the 400-foot group 7 per cent, the 500-foot group 7 per cent, the 600-foot group 6 per cent, the 700-foot group 6 per cent, the 800-foot group 8 per cent, the 900-foot group 6 per cent, the 1,000-foot group 5 per cent and the larger groups combined 42 per cent. Of the total number of logs removed, the 100-foot group embraced 10 per cent, the 200-foot group 17 per cent, the 300-foot group 12 per cent, the 400-foot group 12 per cent, the 500-foot group 9 per cent and the larger groups combined 40 per cent. For the hemlock alone, comprising 25 per cent of the volume yield, the 100-foot, 200-foot and 300-foot log size groups include 31 per cent of the total log scale and 58 per cent of the number of logs.

A tentative application of the variable cost ratios under cost Groups 3, 4 and 5 to the ordinary run of operating conditions and average costs indicates that, for a log size average of 600 feet, the 100-foot and 200-foot log size groups are generally negative; and that for a log size average of 1,000 feet, the 100-foot and 200-foot groups are negative, the 300-foot group commonly negative for top logs and positive for butt logs, the 400-foot group sometimes negative for top logs and generally positive for butt logs, and the 500-foot group positive for all logs except very rough tops.

It is important to note that these tentative estimates of selective effect have not been tested by operative application. A logging operation is an exceedingly complicated combination of interacting steps and it is not safe to assume that the effects of a proposed change in any of these steps will be in measure with and limited to those which can theoretically be anticipated. The disability against the small log is largely controlled by its proportion in size to the average of the group with which it is indiscriminately handled. This disability is reduced by any special adaptation of logging methods or equipment to minor group segregations, such as single settings or portions of a setting, where the average log size is less than for the operation as a whole. It is also affected by any change which alters the percentage of yarding time spent in changing lines, provided the effect of such alteration is not suspended, temporarily or permanently, by bottle-neck control of the rate of log flow at points in the operating line subsequent to yarding. Such changes cause shifts of expense between those which are fixed per acre per setting and those which are variable per M with rate of input. Furthermore, any change in maximum log length affects the number of small sized logs which must be separately handled. There are, of course, many other ways in which the anticipated results of selective changes may be modified or complicated.

Selection by settings, with current logging methods and a wide range in size of trees, generally destroys, or leaves subject to destruction, a large amount of growing stock which would otherwise continue to increase both in volume and value, together with an additional amount of top material currently merchantable but negative in value. If methods can be developed whereby irregularly scattered individual trees can be removed without prohibitive logging cost, this loss of merchantable top material can be greatly reduced and the financially immature growing stock can be conserved for future cutting, thus perpetually removing the manufacturing handicap against the small tree. Recent experiments with crawler tractors indicate that confining current cuttings to the financially mature trees will, with favorable ground and timber conditions, not only increase the selling value per M but will, by virtue of the increase in average log size, tend to reduce rather than increase the cost of logging.

Fire risk.—In considering the fire prob-

lem in relation to selective logging there are two important points to keep in mind.

1. The main objective of economic selection is not the promotion of future values but the avoidance of present losses. The logs, trees and areas selectively left will have no present conversion value and their loss by fire or otherwise, will not affect the main objective of securing the greatest present value in cash conversion from the timbered areas owned or controlled by the operator.

2. The amount of hazardous material in the form of foliage, branches, shattered wood and snags will not be increased by leaving behind some of the saw logs now being taken.

If the application is limited to area selection, the more scattered distribution of fresh slash will tend to reduce the intensity of fire risk to uncut timber and improvements. It will be easier to avoid large compact areas of unburnt slash.

If selection extends to trees as well as areas there will be a very wide variety of conditions to be met. The trees selectively left will tend to be small and numerous. If they are knocked down in logging, there will be no material change in the fire problem as compared with present practice. If they are left standing they will in many cases provide enough shade to make slash burning unnecessary. Where the crown cover is too badly broken for this and slash burning is unavoidable these small standing trees will be killed by the slash fire and will create a somewhat greater fire menace than if the area were logged in accordance with present practice. The main fire risk will, however, remain centered on the areas where logging is in progress and will be controlled primarily by the conduct of the logging operation.

General effect of application.—A critical study of log scale returns for typical yarding settings indicates that full application of economic selection will exclude a considerable portion of the wood volume now being utilized in Douglas fir logging operations. The line of selection first indicated will, however, not be followed without an attempt to adjust operating and marketing practice so as to change some of these minus conversions to plus. After reaching the limit of adjustment in this direction sound operating procedure will require leaving behind that portion of the wood volume which appears to be hopelessly minus as to value. If this checks the production of a type of product for which there had previously been an active demand at an unprofitable price, this price will tend to rise toward a higher point of economic balance, with the probable result that a considerable portion of this previously minus value wood volume will shift back into production again on a plus value basis. Thus a further application of economic selection to the cutting of standing timber will bring further adjustment of operating practice and market prices toward a balance giving the greatest possible economic return from the raw material available.

WHAT IS THE RELATIONSHIP BETWEEN DURABILITY AND SPECIFIC GRAVITY OF WOOD?

By STANLEY BUCKMAN

Division of Forestry, University of Minnesota

A NUMBER of years ago, Zeller[1] published the results of a study on the durability of the wood of longleaf pine (*Pinus palustris*), shortleaf pine (*P. echinata*), and loblolly pine (*P. taeda*). He concluded that, "specific gravity or density of wood materially influences resistance to decay of the heartwood, i.e., the more dense the wood the more durable it is, irrespective of the three species of wood examined." The fungus used in the decay tests was *Lenzites sepiaria* Fr. The percentage loss in weight of the decayed piece was taken as the index of durability.

To the author's knowledge, this is the only extensive study which has been made in an attempt to correlate specific gravity and durability of wood. Because of the fact that this relationship is of considerable importance to wood-using industries, and because the conclusion reached by Zeller has been quite generally accepted, it appears desirable to subject the data upon which it is based to further analysis.

The original data given by Zeller[1] (pages 107-139) were used for the calculations. The initial averages for percentage loss in weight and specific gravity for each series of culture blocks, blocks that had been taken from directly above one another in the original pieces of wood, were grouped into specific gravity and percentage loss in weight classes, the class interval being .05 gm. per c.c. and 1 per cent respectively. For example, the specific gravity class .40—.45 included all the average values with a specific gravity of .401 to and including .450. The final average percentage loss in weight for each specific gravity class was then computed. Each initial average being used in the computation by properly weighing it by the number of replicates upon which it was based. The result of this classification of data is shown in Table 1.

Figure 1 is obtained by plotting the percentage loss in weight values given in Columns 1, 3 and 5 of Table 1. The specific gravity and percentage loss in weight values were plotted on the horizontal and vertical axes respectively. This graph shows that, for the heartwood of longleaf and shortleaf pine, there is an increasing percentage loss in weight with increasing specific gravity. The correlation coefficient obtained for this relation with shortleaf pine was .7056 with a probable error of $\pm$ .0407. The probability of a correlation coefficient of this magnitude being due to errors of random sampling is infinitely small, particularly when one considers the large number of culture blocks used in the tests. This statement should not be misinterpreted to mean that for any individual culture block one could predict the relationship between percentage loss in weight and specific gravity with any degree of accuracy. It does mean, however, that from the data presented, a representative group from a given specific gravity class could certainly be expected to show a relationship of significant magnitude. The data show this relationship even if one is inclined to disregard the percentage loss in weight values for culture blocks above .75 specific gravity. Zeller stated this should be done because these culture blocks had a tendency to lose weight during sterilization.

[1]Zeller, S. M. Studies in the Physiology of the Fungi III. Physical properties of wood in relation to decay induced by *Lenzites sepiaria* Fries. Annals Mo. Bot. Gard. 4: 93-165. 1917.

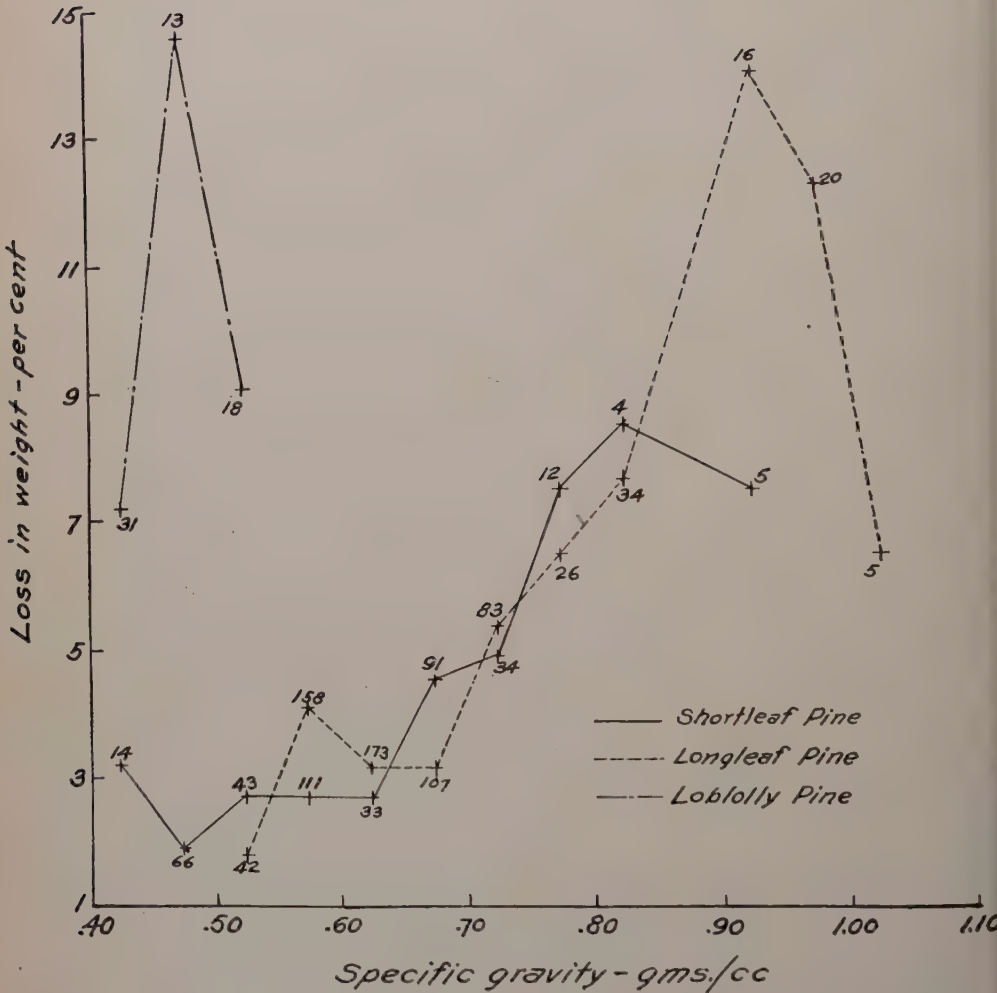

Fig. 1.—The relation of specific gravity to decay of the heartwood of shortleaf, longleaf and loblolly pine.

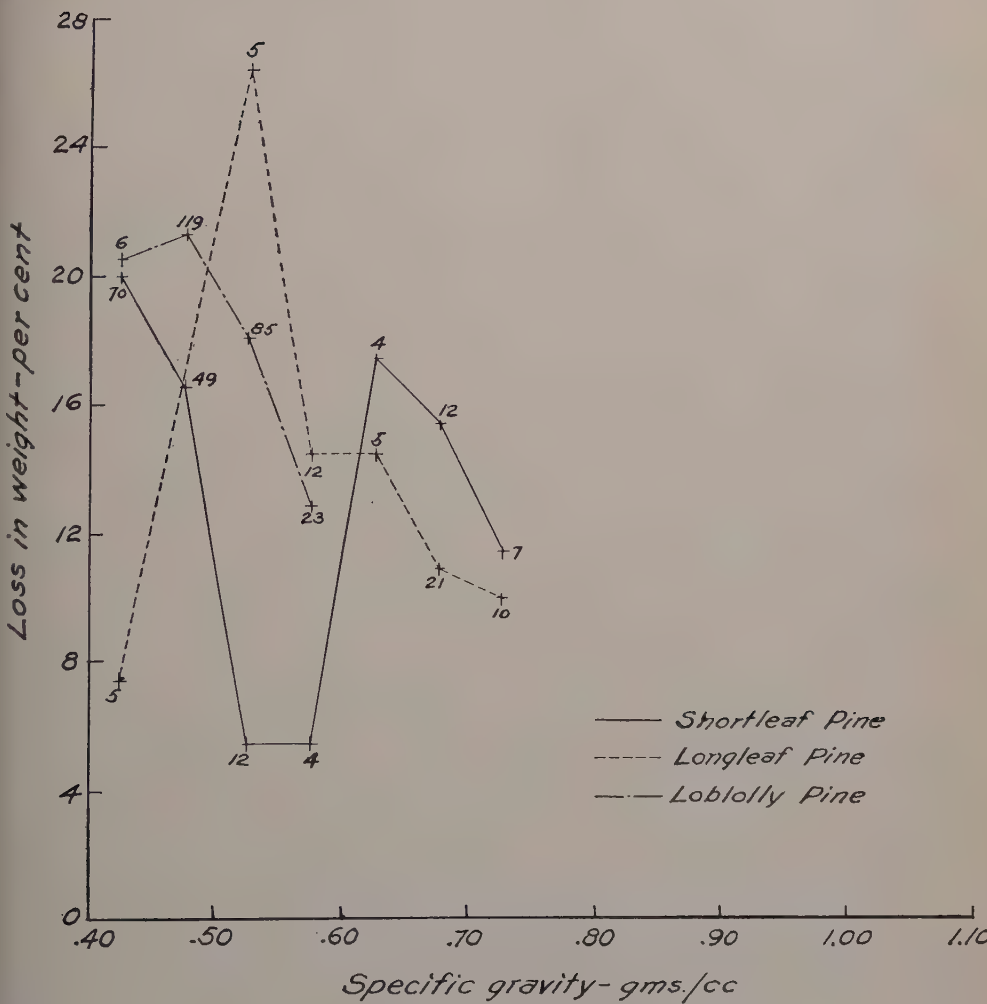

Fig. 2.—The relation of specific gravity to decay of the sapwood of shortleaf, longleaf and loblolly pine.

TABLE 1

THE RELATION OF PER CENT LOSS IN WEIGHT TO SPECIFIC GRAVITY FOR THE WOOD OF SHORTLEAF, LONGLEAF, AND LOBLOLLY PINE

	1		2		3		4		5		6	
	Longleaf pine heartwood		Longleaf pine sapwood[1]		Shortleaf pine heartwood		Shortleaf pine sapwood[1]		Loblolly pine heartwood		Loblolly pine sapwood[1]	
Specific gravity class	Number of culture blocks	Average per cent loss in weight	Number of culture blocks	Average per cent loss in weight	Number of culture blocks	Average per cent loss in weight	Number of culture blocks	Average per cent loss in weight	Number of culture blocks	Average per cent loss in weight	Number of culture blocks	Average per cent loss in weight
.40 — .45			5	7.50	14	3.21	70	20.00	31	7.21	6	20.50
.45 — .50					66	1.91	49	16.58	13	14.58	119	21.33
.50 — .55	42	1.78	5	26.50	43	2.71	12	5.50	18	9.06	85	18.17
.55 — .60	158	4.13	12	13.42	111	2.69	4	5.50			23	12.85
.60 — .65	173	3.19	5	13.50	33	2.68	4	17.50				
.65 — .70	107	3.18	21	9.98	91	4.54	12	15.42				
.70 — .75	83	5.39	10	9.10	34	4.91	7	11.50				
.75 — .80	26	6.50			12	7.25						
.80 — .85	34	7.65			4	8.50						
.85 — .90												
.90 — .95	16	13.94			5	7.50						
.95 —1.00	20	12.20										
1.00 —1.05	5	6.5										

[1]The culture blocks of these groups were composed either wholly or partially of sapwood.

Figure 2 is obtained by plotting the percentage loss in weight values given in Columns 2, 4, and 6 of Table 1. In these tests the culture blocks were composed either entirely or partially of sapwood. If any relationship can be said to exist in this case it is the reverse of what was shown in the heartwood.

CONCLUSIONS

1. Zeller's data do not justify the conclusion that pine heartwood of high specific gravity is more durable than that of low specific gravity. The data for the heartwood of shortleaf and longleaf pine actually indicate the reverse to be true. The writer recognizes that such a relationship, if it actually exists, would be difficult to explain, especially when durability is expressed in terms of percentage loss in weight. Attention is only called to the fact that the evidence presented by Zeller does not justify the conclusion drawn by him.

2. Additional research on the relation of the physical properties of wood to durability is certainly desired.

EDITORIAL NOTE: Although the author's criticism of Zeller's article seems justified on the basis of the definition of durability as given, the question may well be raised whether percentage loss in weight of wood is a good criterion of durability. It seems as if the amount of wood that remains after exposure to decay for a certain period would be more significant from a practical standpoint than the percentage lost. Applying this principle to the shortleaf pine heartwood, it turns out that the amount remaining increased consistently with the specific gravity.

More recent work than Zeller's has indicated, however, that either weight lost or weight retained may be a poor index of serviceability since the strength of infected wood may be greatly reduced with very little change in its weight.—*Arthur Koehler.*

DEVIATION CAPACITY[1] OF FOREST TREES

By L. A. HAUCH

Mr. Hauch is a retired Danish forester who through his numerous publications and practical forestry work attained a leading position among foresters of Northern Europe. In this article he calls attention to the inherent differences between individual trees of the same species and to the advantages which come from establishing densely-stocked forest crops. His ideas and methods have found wide application in Northern Europe. During the period since the war his methods have been severely criticized, mostly on economic grounds, in European periodicals, yet the principles involved should prove of interest to American foresters.

I HAVE requested space in this JOURNAL in order to explain how great density of seedlings in a reproduction is of deciding importance for the success of the stand. I shall try to show that certain European species demand dense reproduction for their best development. True enough, I have treated with this before (3, 5, 6), but the researches of the famous geneticist, W. Johannsen, have thrown new light on the subject, especially on the deviation capacity for the different species and for the races within the species.

During the many years in which I have worked in forestry, Johannsen's researches on heredity have greatly broadened my understanding of the requirements of the different forest trees, and, especially their deviation capacity with which I am dealing in this article. Several statements made by Johannsen will be used as the foundation of this paper.

Johannsen (9) says: "From the genetic viewpoint, the difference between the sperm and the egg is, by and large, insignificant. With a common name, they are called 'Gametes', and the product—the fertilized egg—is called the 'Zygote'. The Zygote contains the chromosomes contributed by the two Gametes, and this product is called the 'disposition impress' or the 'Genotype'. The disposition impress of the Zygote decides or limits the possibility of development possessed by the new-formed individual, but the development is influenced by the environmental conditions. Two Zygotes quite equally disposed, but developing under different conditions, may appear quite differently. The 'appearance impress' or the 'Phenotype' may be different. It is impossible to draw conclusions as to the Phenotype simply from a knowledge of the Genotype. Often the same Phenotypes may be due to quite different causes. It is also dangerous to draw conclusions as to the Genotype, based on knowledge of the Phenotype.

"All of the characteristic features belonging to an organism, the total sum of qualities, all of that which forms the Phenotype, is the reaction of the Genotype with the environment. Therefore, it is quite right to say that the Genotype produces 'the standard reaction' ('Reaktionsnormen') for the new organism.

"A stand will be composed of individuals representing a larger or smaller number of different genotypes which varies with the species. The deviation capacity of the stand is proportionally stronger or weaker, depending on the genotypical differences between the individuals of the stand."

When we observe the most important

[1]"Deviation Capacity," a circumscription of the Danish word "Spredningsevne" (German: "Ausbreitungsvermögen or "Ausscheidungsvermögen") is similar in meaning to "Expression of Dominance," but is more inclusive. covering variations in form and growth habits as well as the ability to differentiate into crown classes.

tree species in Denmark,—beech (*Fagus sylvatica*), oak (*Quercus rubra*), and Norway spruce (*Picea Abies*),—we find that stands of beech and oak contain more different genotypes than stands of spruce. If we, in a forest nursery in which the soil is of exactly the same quality, arrange side by side one bed with oak, one bed with beech, and one with Norway spruce, taking care that the number of plants per area is alike, as well as their distribution within the bed, we will then find after a few years greater difference regarding height as well as form among the young seedlings of beech and oak than among those of spruce. This shows that beech and oak have a stronger deviation capacity than spruce. This fact, moreover, becomes more obvious where the site is fertile than where it is less fertile. On the poor site the variation between the different plants is diminished and the stand becomes more homogeneous. Certain species possess a stronger deviation capacity than do others. This is more pronounced under good site conditions where a dominant class raises itself decidedly above an understudy of suppressed trees.

Not only does deviation capacity vary between species, it also varies in the different races within the same species.

Further light is thrown upon this observation by some experiments made by me for the Danish Forest Experiment Station near Soröon, Seeland. The experiment was carried out with acorns of Danish origin as well as with acorns of the same species from southern parts of Europe (6). The last investigation of the experimental plots was made in the autumn of 1927, when the stand had an age of 16 to 18 years. It was then evident that the local oaks distinguished themselves remarkably by having robust shoots with well-developed swelling buds, whereas those from southern parts of Europe generally had slender shoots and tiny, weak buds. This was caused by the fact that a far greater number of seedlings from the native oaks had only spring shoots whereas the foreign oaks had long, slender summer shoots.[2]

The southern oaks, those from the aforementioned experimental plot, as well as all oaks from Southern Europe, when transplanted to Denmark, become differently shaped than do those from native acorns. They form stands which are more beautiful but show greater sensitiveness to hostile climatic influences. They have straighter stems and more pyramidal crowns than the Danish oaks, and the stands contain a smaller number of different genotypes. To this, however, another factor may be contributing. As our native oaks are poor seed producers, the Danish acorns must be gathered from many different stands, whereas in southern parts of Europe, the acorns being more abundant, the seed can be gathered from one stand or from very few. It is therefore probable that a lot of local acorns contains more Genotypes than does a corresponding lot of acorns from southern parts of Europe. Both these causes may explain the fact that for oaks, originating from parts of Europe further south than Denmark, a greater number of excellent stems are found within one stand than among native oaks. That is to say, the deviation capacity is less pronounced in the foreign than in the Danish oaks.

All these facts are in accordance with what Johannsen has set forth clearly. Particularly they agree with this statement (8): "All sexual propagation is, above all, an imposing arrangement of oblivion as to individual experiences." In accordance with this is the aforementioned fact that, when the plants have originated from acorns from parts of Europe warmer than Denmark, they do

[2]The part of the annual shoot frequently produced in oak after a resting period of a few weeks. Often called "Lammas Shoot" in English botanical literature.

not respond to the colder climate to which they have been transferred. They have not shortened the vegetation period which is characteristic of the mother trees in the milder climate from which they originated. The fact that they have been exposed to climatic conditions with earlier autumns has not accomplished any change as to their inherited disposition for continuation of growth.

These experiences regarding oaks of different origin throw light on the statements made by Johannsen (9): "Great stress must be laid on the inherited qualities. We must understand that this is due to the constancy of the Genotype, to the fact that the Genotype is unchangeable, even when the plants are placed under the most different environments."

Formerly we looked upon this matter from quite a different angle. One has been, on the contrary, quite uncertain as to the question of the influence of the Genotype. Borggreve (1) has even gone so far as to express the opinion that, when deciding which individuals of a stand finally are left, the inherited qualities will be of little, if any, consequence. Cieslar (2) speaks of "Klimavarietäten". He has made experiments with Norway spruce on different sites and has shown that spruce from the mountains has a different shape and shorter needles than those growing in the valleys. He has called these different types "climatic variations," thinking that the climatic conditions have changed the character of the species. However, from evidence mentioned above, we are able to explain the phenomenon by saying that different Genotypes have reached development. In the mountains, only certain Genotypes have been able to stand the hard climate, and have been left. In the valleys, the individuals of different Genotypes have been able to develop. That means not an adjustment to the site by the single individual but a selection among the already existing combination of types.

Building on Johannsen's view of the matter, the density of stocking is the deciding factor as to the quality of the stand. Great stress must be placed on starting the stands with the greatest possible density of stocking, because if the Genotypes produce the standard reaction of the formed organism, the consequence must be that we should aim at a great choice of such Genotypes, which, on this special site, are able to produce the Phenotype we want.

Looking from the opposite point of view, one must conclude that there are no inherited differences in the individuals of a stand. Lamarck's followers will not even use the terminology introduced by Johannsen. To them, the idea of different Genotypes does not exist. They find density of stocking quite meaningless,—at best, a waste of seed. It may even be dangerous, because great density of stocking (according to this view all seedlings are disposed alike) might cause a struggle, thus hampering the seedlings. There is no lack of advocates for this theory; thus Wagner remarks that Tichy (1891) in his "Der qualifizierte Plenterbetried," states: "No forester would be acting rationally by producing a denser reproduction than was absolutely necessary and justified as good business. Overstocking would be an even worse business proposition than surpassing the financial rotation." (12).

However, a long life devoted to practical silviculture has made me look upon Johannsen's theory as being reliable. My personal experience is that, concerning tree species with strong deviation capacity, especially when growing on fertile soil, too dense reproduction cannot occur. I have noticed that the most beautiful development of beech and oak has resulted from dense reproduction, and by dense reproduction I mean compact tangles of plants. Too great density of stocking can hardly be imagined. While dense natural reproduction can easily be se-

cured, I have also, in artificially produced stands, aimed at having no less than 80,000 seedlings per acre. This view has been our leading principle in silviculture during two generations.

The Great War, however, seems to have changed the point of view. Since then, during the later years, conflicting views have appeared. When I have maintained the point that dense reproduction has the effect of producing stands which contain in greatest measure tree forms for which we strive, I have been contradicted by the saying: "When Hauch thinks that only by a very great number of seedlings is he able to secure a sufficiently great selection of good Genotypes, the answer must be that, even before the first thinning, only a small fraction of the original number of seedlings remain. The rest have succumbed to the competition." This is quite right, but it is probable that just this fraction contains a comparatively large number of vigorous Genotypes.

Further on, it is said that we cannot be sure that Nature is inclined to cause those individuals to survive, which are best adapted to our purpose. This statement also is right; nature is purposeless but, on the other hand, when we, to the best of our judgment, in a stand of young beech or oaks, have selected 4000 trees per acre, where the original number of trees was 200,000 or more, we must take it for granted that these 4,000 trees will turn out more in accordance with our aim than if we had started with only 4,000 casual seedlings. If we could not take this theory for granted, all our work with selection of plants would be in vain. That this is not in vain can be concluded from the fact that we are able to point out many excellent stands of beech and oak which result from very dense reproductions. We often find, on the other hand, stands of poor quality resulting from widely-spaced plants.

When we consider the species which have a weaker deviation capacity, we find that, even here, the natural densely-stocked stands in some places show fine results. As a rule, however, we have to be content with fewer plants. As I have before mentioned, it is preferable that a reproduction of beech or oak should contain about 80,000 plants per acre. In a plantation of Norway spruce, we will find that no more than 2,600 to 3,000 plants per acre are necessary, because the individuals here are more homogeneous than is the case with beech or oak. Consequently, species of trees having a strong deviation capacity, such as beech and oak as a rule have to be sown or planted as seedlings. It is the same when we are planting Scotch pine (*Pinus sylvestris*), which also has strong deviation capacity, while species with weak deviation capacity, like Norway spruce are planted as transplants.

Though silviculture in North America deals with species and conditions different from the European, yet I have the hope that my article may arouse some interest and especially that Johannsen's point regarding the important function of the Genotype may be appreciated. It is essential when establishing natural reproduction or the plantation, that there be a sufficient number of individuals of such Genotypes that the stand in the future may contain, in sufficient number, the forms which we desire.

The World War has lowered ethical standards along several lines. I believe that this, to some extent, is the case when sight is lost of the importance of using high plant density with species having a strong deviation capacity. There seems to have been neglect of the importance to mankind of the creation of the best possible forest. The economic situation does not alter this fact. In the case of artificial reproduction, the greater plant density may well increase expenses. This density, however, for the species with strong deviation capacity is neces-

sary for the creation of the best forest. The requirements of the species do not diminish because of the depression.

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It is, perhaps, unfortunate that foresters should have taken over the word "weed" from farmers. The word suggests that all but the planted trees should be destroyed, and this is another agricultural tradition which foresters are very slowly growing out of. The modern ecological view that a wood is a complex system in which the trees, shrubs, ground vegetation and the soil fauna and flora combine to preserve a healthy and stable condition leaves very little use for the word "weed."
—*Quarterly Journal of Forestry* (English).

METHODS OF BREAKING DORMANCY IN CERTAIN FOREST TREES

By PAUL J. KRAMER[1]
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It is frequently desirable to have actively growing tree seedlings available in midwinter for experimental purposes. Most tree species have a dormant period of several months even in a warm greenhouse, and can be used only in the summer unless an effective method of breaking dormancy can be developed. The results of experiments with seedlings of red oak, white oak, and yellow poplar, and with the twigs of red gum and beech are given herewith.

MUCH of the work on dormancy in woody plants has been done on ornamental species and relatively little information is available concerning methods of breaking dormancy in forest trees. Stuart (18) found that treatment with various chemicals including chloroform, ether, ethyl bromide and ethyl iodide hastened the resumption of growth in various ornamental shrubs. Howard (14) reported that exposure to ether, desiccation, freezing and other treatments hastened the opening of the buds on many species of trees and shrubs. He found it most difficult to break dormancy in certain forest trees including some of the oaks, hickories, ashes and yellow poplar. According to Coville (3), blueberries kept in a warm greenhouse during the winter remained dormant in the spring long after bushes left out-of-doors had resumed growth. Exposure to temperatures slightly above freezing for two or three months, however, was followed by the immediate resumption of growth when the plants so treated were placed in a warm greenhouse. Denny and Stanton (4) reported that potted specimens of several species of ornamental woody plants which had been treated with various chemicals came into flower or leaf from two weeks to two months before the untreated control plants. Of the various chemicals tested ethylene dichloride and ethylene chlorhydrin were found to be particularly effective. Deuber and Bowen (10) reported partial success in breaking dormancy in sugar maple by the use of ethylene chlorhydrin. They noted that dormancy was broken most readily in trees which had been kept out-of-doors during the early part of the winter. Bramble (1) found that potted sugar maple seedlings placed in the greenhouse before leaf fall became dormant and remained inactive until the following August. Trees treated with ethylene chlorhydrin in early June were in leaf by July 1. Treatment of dormant chestnut seedlings with ethylene chlorhydrin caused them to begin growth three months in advance of the usual time.

The present investigation deals with methods of breaking dormancy in seedlings of yellow poplar (*Liriodendron tulipfera* L.), red oak (*Quercus borealis* L.) and white oak (*Quercus alba* L.) and twigs of beech (*Fagus grandifolia* Ehrb.) and red gum (*Liquidambar styraciflua* L.). The experiments on yellow poplar extended over two winters, those on the other species were confined to one winter.

[1]The writer wishes to acknowledge the cöoperation of Dr. C. F. Korstian, Director of the Duke Forest, and F. H. Claridge of the North Carolina State Department of Conservation and Development, in providing most of the tree seedlings employed in this investigation; also the kindness of the Durham Ice Cream Company in permitting the storage of seedlings in one of their cold storage rooms.

The effects of treatment with thylene chlorhydrin, exposure to low temperature, and exposure to low temperature followed by treatment with ethylene chlorhydrin were investigated. Ethylene chlorhydrin was chosen from among the various chemicals used by previous workers because it has been found to be very effective on a variety of plants. Furthermore, it can be handled with safety and the cost of treatment is low.

Methods and Results

For the sake of clarity the behavior of each species will be discussed separately.

Yellow Poplar—The first lot of yellow poplar seedlings was brought in from the nursery on November 25 and immediately potted. The next day 8 trees were treated for 24 hours with ethylene chlorhydrin used at a concentration of 4 ml. of 40 per cent liquid per liter of space. In 3 weeks small leaves had appeared on three of the trees and in 5 weeks or by January 1 three more trees had developed leaves. The two remaining trees died, possibly due to the effects of the unusually high concentration of ethylene chlorhydrin used. Untreated trees did not produce leaves until early March.

On December 19, a number of seedlings were placed in a refrigerated room kept at a temperature of 3 to 4°C. Lots of 6 trees were removed to the greenhouse at the end of 2, 6, and 8 weeks. None of these trees developed leaves until after March 1. Apparently exposure to a temperature slightly above freezing did not hasten the breaking of dormancy. Several dozen seedlings were brought in from the nursery the last week of January and all of these trees developed leaves the latter part of February. These seedlings had been exposed to a period of sub-freezing weather not experienced by those brought in November 25, which fact may account for their more rapid resumption of growth when placed in a favorable environment.

The seedlings used in the second series of experiments were brought in from the nursery and potted in January following their first growing season. They were then 8 to 10 inches in height. They grew vigorously in the greenhouse and by the end of the summer had attained a height of 18 to 24 inches. Early in October part of the trees were transferred to a cold frame on the north side of the greenhouse. The trees kept in the greenhouse shed their leaves and became dormant as soon as those placed outside. The trees in the cold frame were exposed to several frosts and two periods of 3 to 4 days when the temperature was down to —8 to —10°C. On December 21 the trees were divided into seven groups which will be designated by the letters A to G. Groups A to F contained 12 to 15 trees each, while group G contained 8 trees.

Group A was kept in the greenhouse during the entire period of the experiment. The first leaves appeared on these trees about March 21. By the first of April 6 trees had produced leaves, but it was not until the middle of May that all 15 were in leaf. This group exhibited two interesting characteristics which were also shown by another group of 20 trees that received very similar treatment. The first was the long period of time (nearly 2 months) intervening between the date when the first buds began to open and the date when all the trees had resumed growth; the second that in many cases the lateral buds opened long before the terminal bud of the same tree, a phenomenon that seldom occurs out-of-doors. Although some trees of this group came into leaf much later than others even the last trees to leaf out grew well during the summer.

Group B was kept in a cold frame on the north side of the greenhouse during

the autumn and winter. The first buds opened about March 24 and by April 10 all the trees were in leaf. The yellow poplars in the forest also came out in leaf during this period. In all trees of this group the terminal buds opened in advance of the lateral buds.

The trees of Group C were treated in the same manner as those of Group B until December 21 when they were removed to the greenhouse. The first buds opened on trees of Group C on February 3, about 6 weeks after they were placed in the greenhouse. In 7 weeks half the trees possessed leaves and in 10 weeks all but one tree were fully in leaf. It leafed out a few day later. This group made a very vigorous growth during the early spring.

Group D was kept in the greenhouse during the entire fall and winter, but was treated with ethylene chlorhydrin December 21 to 23. The method of treatment was similar to that described by Denny and Stanton (1928). Six ml. of ethylene chlorhydrin were used for each 100 liters of space in the gas chamber and the trees were exposed to the vapor for a period of 48 hours at a temperature of about 20°C. The chemical was placed in a shallow dish near the top of the chamber and distributed by operating an electric fan for a few minutes twice during the treatment. Two weeks after the trees were returned to the greenhouse 6 trees had produced leaves, in 3 weeks 12 trees bore leaves and in 4 weeks 14 trees were in leaf. The 15th tree remained dormant until the last of May when it began to develop in a normal fashion. In about half of the trees the lateral buds opened in advance of the terminal buds. In fact, the terminal buds on 2 or 3 trees did not open until the latter part of April although the lateral buds had been growing for over 2 months.

The trees of Group E were taken in from the cold frame on December 21 and treated with ethylene chlorhydrin in the manner just described. In 2 weeks buds were open on 14 trees and in 4 weeks these were in full leaf while the buds of the 15th tree were just opening. These trees grew more vigorously than the trees of Group D.

Group F was kept in the cold frame until December 20 and was then placed in a refrigerated room at —20°C. for 5 days. Seven weeks after they were placed in the greenhouse lateral buds were open on 3 trees. All except 2 of the terminal buds were found to be dead, but the lateral buds finally opened on 7 additional trees and made a vigorous growth. The remaining 3 trees died.

Group G was treated in the same manner as Group F except that it was left in the refrigerated room for 2 weeks. Six weeks after they were returned to the greenhouse three fourths of the trees were in leaf and the buds were swelling on the remainder, except for one tree which died. The terminal buds of these trees developed normally. It is difficult to understand why most of the terminal buds of this group were uninjured while many of those of Group F which was left in the refrigerated room only 5 days were killed.

The behavior of Groups A to E is shown graphically in Figure 1.

Other Species

A group of red oak seedlings was treated at the same time and in the same manner as the yellow poplar seedlings just described. Most of the seedlings left out-of-doors lost their leaves in December while those kept indoors retained their leaves until February or, in a few cases, March. In all other respects the response of red oak to the various treatments was practically the same as that of yellow poplar.

White oak seedlings placed out-of-doors

lost their leaves in December, but seedlings kept in the greenhouse retained their leaves during the entire winter and a few were still green the following June. In February the trees kept indoors began to grow and soon produced several centimeters of twig growth and a new crop of leaves. Dormant trees brought in from out-of-doors January 3 responded to warmth and ethylene chlorhydrin in the same manner as the yellow poplar.

Twigs of beech and red gum brought indoors during the first week of January and treated with ethylene chlorhydrin produced new leaves much sooner than untreated twigs.

Discussion

The species used in these experiments presented marked contrasts with respect to the persistency of their dormant period. Yellow poplar seedlings kept in a warm greenhouse under conditions favorable for continuous growth lost their leaves and became dormant just as soon as similar seedlings placed out-of-doors. Furthermore, many of them remained dormant as long or longer than the trees left outside. It seems clear that in such cases dormancy cannot be due to unfavorable temperature conditions. Howard (14) suggested that the annual exposure to unfavorable conditions in the autumn produces an internal rhythm which causes plants to become dormant even when placed under conditions favorable to growth. According to Howard this rhythm must be transmissible through the seed as oak and other seedlings grown in the greenhouse may became dormant even though they have never been exposed to unfavorable conditions. He also cites experiments indicating that plants kept in a greenhouse for several years may change from the deciduous to the evergreen type.

Garner and Allard (11) believe that length of day may be an important factor both in the initiation and in the breaking of dormancy of some species of plants. They found that potted yellow poplar trees exposed to electric light from sunset to midnight during the autumn and winter continued to grow and produce new leaves. Individual old leaves died from time to time, but failed to absciss. Specimens of smooth sumac (*Rhus glabra* L.) treated in the same manner retained their leaves in a living condition all winter, but failed to make any new growth while the leaves of dwarf sumac (*Rhus copallina* L.) colored and fell only a few weeks later than normal. Plants in a greenhouse are exposed to variations in length of day just as are those outside. It seems more probable that decreasing length of day may cause certain species to become dormant even when kept under conditions otherwise favorable for continued growth, than that dormancy is due to any "internal rhythm."

Little definite information is available concerning the internal physiological conditions associated with dormancy. It has been suggested that reaction to variations in length of day may be associated with changes in the carbohydrate-nitrogen relations of the plant. In this connection it is interesting to note that Chapman (2) reported that in yellow poplar both "high and low available nitrogen favor an early beginning and early breaking of dormancy" as compared with moderate applications. The investigations of Howard (15), Coville (3), and Denny and Stanton (4) indicate that dormancy is not systemic, but is definitely localized in the buds. These workers found that by treating individual twigs or even single buds they could be caused to resume growth while the remainder of the plant was yet dormant. Howard believed dormancy to result from the suspension of enzyme action. Denny (7, 8), Denny, Miller and Guthrie (6), Guthrie (13), Denny and

Miller (9) and Miller (17) have investigated the changes in enzyme activity, respiration and chemical composition following treatment with various chemicals. The changes in chemical composition in most cases were found to be small and not necessarily related to the effectiveness of the treatment. Increases in enzyme activity and respiration were observed following treatment, but it appears that these may be indirect rather than direct results of the treatments. The dormant condition probably is the result of the interaction of a number of factors and much more work will be necessary before its nature is understood or the reasons are known why certain treatments bring it to an end.

The white oak seedlings kept in the greenhouse retained their leaves until long after a new crop had been produced. White oak seedlings placed outside until early January did not come out in leaf any sooner than did red oak when returned to the greenhouse. Apparently if white oak becomes dormant it is as difficult to bring about the resumption of growth as in species such as yellow poplar which become dormant regardless of the environmental conditions. In white oak dormancy is apparently caused by unfavorable temperature conditions and it does not seem to be sensitive to changes in length of day.

Comparison of the behavior of trees exposed to low temperature for a time with the behavior of trees kept continuously in the warm greenhouse indicates that previous exposure to low temperature distinctly speeded up the response of all three species to warmth and ethylene chlorhydrin. As previously mentioned, trees left out-of-doors during the autumn and winter came into leaf more rapidly and uniformly than trees kept indoors. Trees kept out-of-doors until late December or early January and then placed in the greenhouse came out in leaf sooner than those kept continuously indoors and those taken indoors and treated with ethylene chlorhydrin produced leaves sooner than the trees which had been kept in the greenhouse prior to treatment. The most rapid breaking of dormancy, followed by the most uniformly vigorous growth was secured by a preliminary exposure to low temperature, followed by treatment with ethylene chlorhydrin.

These facts are not surprising since low temperature seems to be the principal agency that breaks dormancy in nature. As pointed out by Coville (3), some plants do not leaf out until much later than normal unless exposed for a sufficiently long period to low temperature. A notable example is the limitation on the southward extension of peach growing in Georgia due to the frequent failure of the trees to produce flowers and leaves as soon as warm weather comes. Hutchins (16) has shown that this abnormal prolongation of dormancy results from too short a period of cold weather during the winter.

The reason why exposure to low temperature shortens the dormant period is little better understood than is the reason why treatment with chemicals will shorten dormancy. Coville (3) found that the ratio of starch to sugar in blueberry wood was much higher in the autumn than in the spring just before growth started. He suggested that exposure to low temperature increases the permeability of cell membranes to enzymes which bring about the transformation of starch to sugar. There is no direct proof however, that this is the case and other explanations of the accumulation of sugar are possible. It is well known that in many plants exposure to low temperature often is followed by a decrease in starch and an increase in sugar or fats (12). It seems probable that as the temperature decreases the rate of respiration is slowed up more than the rate at which sugar is changed

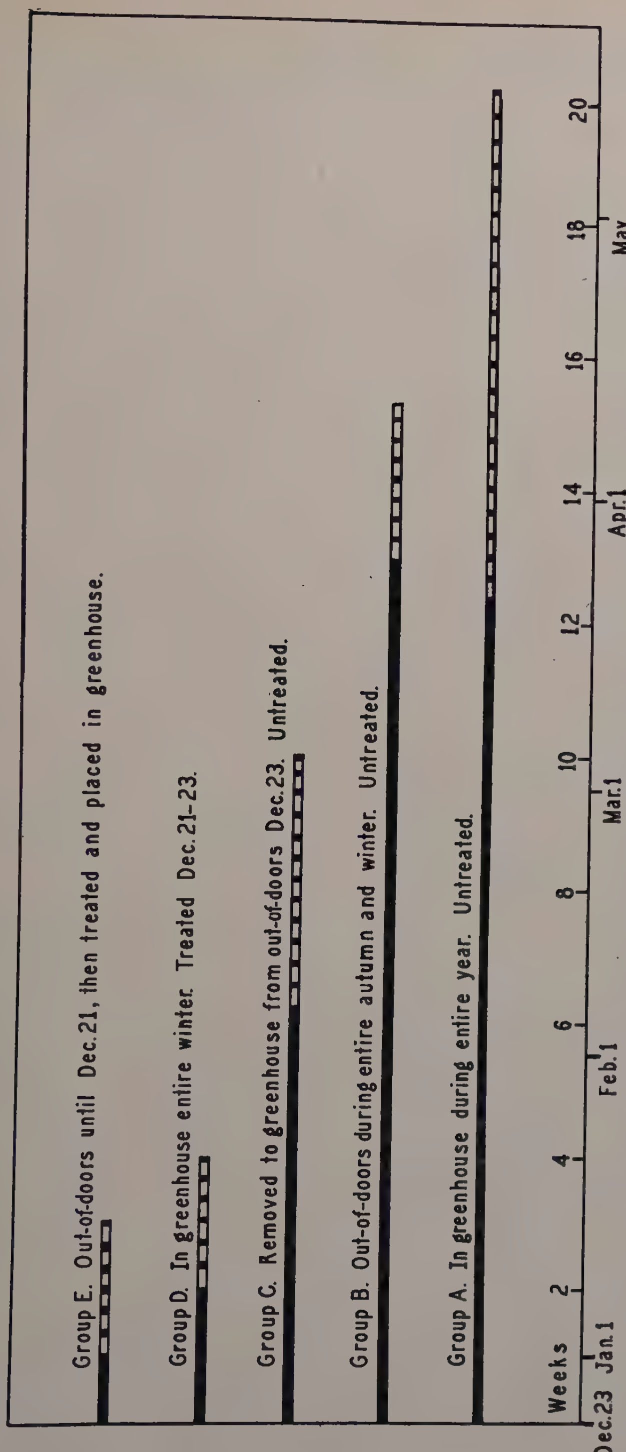

Fig. 1.—Reaction of yellow poplar to various treatments. End of solid line indicates date when first buds opened while end of barred line indicates date when 85 to 100 per cent of the trees were in leaf.

to starch, resulting in the accumulation of sugar. It has not been shown definitely that this accumulation of sugar is directly related to the breaking of dormancy.

It is evident from the results of this investigation that it is possible to break dormancy and have vigorously growing trees of the species studied available in midwinter for experimental purposes. It is probable that equally good results could be secured with other species if the optimum concentration of ethylene chlorhydrin or other chemical to use or the most effective period of exposure to low temperature were known. Apparently ethylene chlorhydrin may be used over a fairly wide range of concentrations, but if the concentration is too high some buds may be killed while if it is too low some trees will fail to respond. The concentration used in these experiments probably is near the lower limit and higher concentrations might well be tried.

The optimum concentration probably depends on the species, the stage of dormancy and the length of treatment. Even though all the conditions seem to be uniform not all trees respond in exactly the same manner and an occasional tree entirely fails to respond.

The optimum temperature may also vary, but is near the freezing point. Coville (3) reported that exposure for 2 to 3 months at a temperature a few degrees above freezing is effective, but it appears possible that in the case of yellow poplar a short period of freezing may be more effective. Apparently temperatures many degrees below freezing are not only unnecessary, but sometimes may be actually injurious.

Summary

1. The abscission of leaves from yellow poplar seedlings occurred as early in plants kept in the greenhouse as in plants kept out-of-doors. Red oak seedlings retained their leaves somewhat longer in the greenhouse than outside. White oak seedlings kept in the greenhouse retained their leaves during the entire winter and began producing new leaves before the old leaves abscissed. The leaves of white oak seedlings placed out-of-doors abscissed sooner than those of red oak.

2. Seedlings of yellow poplar and red oak kept out-of-doors during the autumn and early winter and then brought into the greenhouse began growth sooner and grew somewhat more vigorously and uniformly than did similar seedlings which had been kept continuously in a warm greenhouse during the autumn and winter.

3. Treatment of dormant yellow poplar, red oak and white oak seedlings with ethylene chlorhydrin resulted in the breaking of dormancy in 85 to 100 per cent of the trees three weeks to two months in advance of the untreated trees.

4. Seedlings which had been kept out-of-doors during the autumn and early winter responded slightly more rapidly to treatment with ethylene chlorhydrin and made somewhat more vigorous growth than did seedlings kept continuously at greenhouse temperatures prior to treatment.

5. Twigs of beech and red gum brought into the greenhouse and treated with ethylene chlorhydrin produced leaves sooner than similar twigs which were not treated.

6. While exposure to low temperature and treatment with ethylene chlorhydrin were both found to be effective in breaking dormancy in advance of the usual time the most rapid response and most vigorous growth were obtained by exposure to a period of low temperature followed by treatment with ethylene chlorhydrin.

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USE OF PORTABLE MOTOR SAWS IN LOGGING

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The use of the saw instead of the axe alone in felling and bucking timber has tremendously increased logging efficiency, but, in spite of this and of continuous improvement of crosscut saws and bucksaws, sawing wood is still slow, strenuous and expensive work. We are likely to see before long the introduction of portable motor saws; first, in bucking timber; then also in felling it. The depression dampened the interest of loggers and foresters in motor saws, but now, with the upward trend in woods wages, their possibilities deserve much greater attention than they receive.

SINCE the war, and particularly during the last seven years, many models of portable motor saws for logging have been constructed and tried out in various countries, but of special interest to us is the work done recently in the United States, Canada, Germany and the U. S. S. R.

In the United States it has been characterized, unfortunately, by a somewhat haphazard approach. Without organized coöperation from wood-using industries or the government, several models of portable motor saws were constructed and hundreds of demonstrations and trials made. The real value of such machines can be determined only through long enough use of them under the conditions of commercial logging operations, but, although sensational results were claimed in most of the cases, the conducted trials, with rare exceptions, were not thorough and systematic enough to give really convincing results. The Wolf motor saw appears to be by far the most promising among American models. There is, however, a need for a thorough and unbiased survey of the practical possibilities under our conditions of all promising motor saws of both domestic and foreign makes. American technical literature on this machinery is very meagre, consisting almost exclusively of fairly numerous but too brief and usually not very dependable items in professional periodicals.

In Canada conditions are scarcely better. No practical motor saws for logging have been constructed here, but, as in the United States, a number of German motor saws and some American models have been repeatedly demonstrated; some of these have been tried in woods operations, but for too limited a time and, therefore, with rather inadequate and vague results. The literature is very meagre.[1]

Germany has produced a greater number of fairly practical models of motor saws than any other country. Many tests were conducted with the painstaking care characteristic of the Germans. The investigation conducted in 1931-32 under the auspices of Ausschusses für Technik in der Forstwirtschaft[2] stands out as par-

[1]The only article of considerable size published in Canada on this subject is the report by the writer on "Portable Motor Saws and Their Applicability to Cutting Pulpwood in Canada." However, this was prepared in 1930 and is somewhat out of date.

[2]A copyrighted report on this, with many graphs and illustrations, occupies 60 pages in "Mitteilungen des Ausschusses fur Technik in der Forstwirtschaft," July 1932, procurable from Dr. F. v. Monroy, Deutscher Forstverein, Berlin, SW 11, Dessauerstrasse, 26.

ticularly informative. Everyone interested in the technical aspects of portable motor saws for logging purposes should familiarize himself with this study. It appears that portable motor saws have about passed the experimental stage in Germany, and in some instances are already used on a limited scale in commercial logging operations.

During the last five years more work has been done in Russia than in any other country in the study of motor saws and in experimentation with them in logging. In this the Russians have been persistent. Many German-made motor saws have been used in the woods for long periods in various parts of the country to determine comparative advantages of their construction, the best methods for their use and the most suitable conditions for their introduction. Under governmental supervision many systematic tests were conducted by practical loggers as well as by trained investigators. Numerous reports on portable motor saws and their performance were published.

Ten or more of these reports that the writer perused leave an impression that in Russia they believe in the practicality of motor saws in logging and, in spite of their cheap woods labor, they are determined to introduce them on a large scale. For several years they have been working with various models of foreign-made motor saws, studying their good and undesirable features and now, on the basis of this experience, they have constructed their own light-weight motor saw (Figure 3). If it proves as successful as they expect it to be, this will give a great impetus to the wider use of this type of machinery in the Russian operations.

In connection with the use of portable motor saws for logging, consideration should be given to the construction of the saw, the method of its use and the suitability of the conditions.

Over a hundred models of this machine have been produced in recent years in various countries, to be operated by steam, compressed air, internal combustion motors and electricity with reciprocating, circular, band or chain saws. For logging purposes, the most promising types are chain saws operated by gasoline motors. Among them should be mentioned the Wolf saw, made by the Reed-Prentice Corp. in the United States; Leitz, Stihl, Dolmar, and Rinco, made in Germany; and the new Russian model, Uvarov.

Among the few models of portable band saws, Carl Brun's Handbandsäge of German make is of interest. Its speed of sawing proper is greater than that of any of the chain saws because its kerf is comparatively narrow (about one-fifth of that of the usual chain saws).

A practical portable motor saw must have a very high cutting speed; it should be light enough to handle easily; durable, i. e., lasting and relatively free from break-downs; reasonably safe; and reasonably cheap.

As we cannot make the explanations necessary here, the following statements on the speed of sawing are apt to be somewhat misleading because it varies within wide limits, due to many factors. However, the following will give an approximate idea: if we assume that cross-cutting relatively small or medium-sized softwood logs with a cross-cut saw or a bucksaw takes 160 man-seconds per square foot, the corresponding speed with a good motor saw will be perhaps but 25 seconds, although it may range from 50 seconds to as high a speed as 10 seconds per square foot of the cross-sectional area (speaking of the time required for sawing proper). Thus we may assume, roughly, that portable motor saws can cut in bucking, say 5 or 10 times as fast as sawing by hand. In making a felling

cut the speed of sawing both by motor saws and by hand is, of course, considerably less.

Most of the above-mentioned motor saws are intended for operation by two men, and they weigh between 80 and 100 pounds. This is too much; but some motor saws are even heavier, and require three strong men for their operation. Among the lighter saws is the American-made Wolf model, which weighs, without fuel, from 70 pounds up, depending on its size; while several German saws are almost as light as this, the Russian saw, constructed recently by Uvarov, weighs only 62 pounds.

Reduction of the weight of portable motor saws without detriment to the other features of their efficiency is one of the main problems with which designers of this machinery are confronted.

Safety considerations require that a motor saw could be stopped instantaneously by the operator without removing his hands from the handles of the machine; also that the saw could be stopped when it is moved even a very short distance, to be started again without cranking of the motor. These requirements have been satisfied in the best of the existing models.

The durability of motor saws has been very greatly improved lately, and their initial cost, although still high (in most cases between $300 and $500), shows a tendency to come down. However, only mass consumption will bring their price, and so the overhead, to a relatively low level.

If motor saws prove at all practical in European countries, they should prove more practical in the United States or in Canada, because of the much higher wages. Considering that the saws are beginning to penetrate into commercial operations in Russia where woods wages are relatively low, we can expect the introduction of this machinery into American operations fairly soon, provided we do not run into another economic depression which, through low wages and unemployment, would require reverting to more primitive methods instead of the further introduction of labor saving devices.

Opinions differ, but the writer believes that motor saws can be effectively introduced in logging fairly small or medium-sized timber; for large timber the much greater weight required would be a hindrance. Pulpwood or cordwood operations probably are the most suitable for this reason and also for the reason that in cutting pulpwood the amount of sawing required per volume unit of wood is greater than with saw logs; further, it is much easier to apply motor saws with commercial success to bucking timber into comparatively short bolts than to felling trees. It follows that motor saws should have the best chance if used for cross-

Courtesy of Reed-Prentice Corp

Fig. 1.—Wolf chain motor saw.

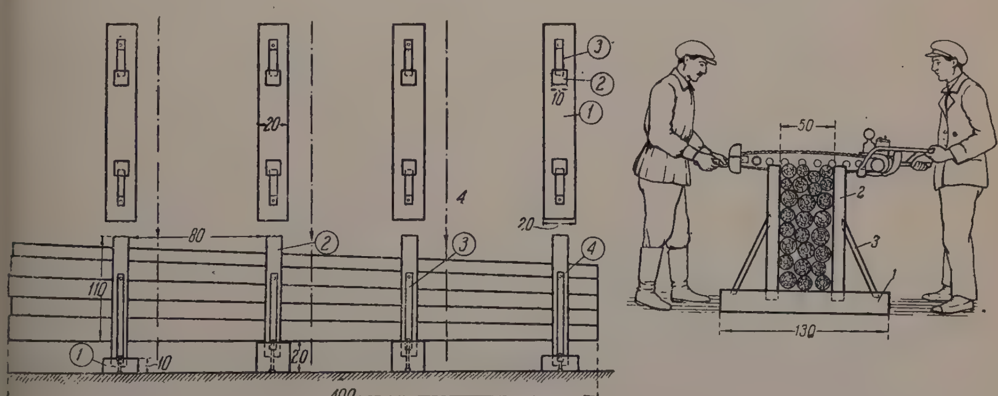
cutting tree lengths or long logs into short pulpwood or cordwood bolts after timber has been skidded to the yards or landings.

Analysis of common practices of bucking wood in the United States, in Canada and in Europe indicates that usually only from one-quarter to one-third of the sawyer's time is occupied by sawing proper, the rest of the time being spent upon the variety of intermediate steps of work, unavoidable delays and rest. It is obvious that to employ motor saws efficiently the usual practice should be modified, and the enlarged crew must be so organized that men with the saw can work much more continually while other men do the rest of the necessary work. With this arrangement the productive work of a motor saw can be increased to 70 per cent of the working day.

Below are given some extracts from a letter to the writer from Mr. Gordon Brown of the Brown Company in New Hampshire. He has experimented with the Wolf motor saw in cutting pulpwood more persistently and successfully than others we know of in the United States. Unfortunately, it was found necessary, due to labor conditions, to discontinue the experiments before final conclusions could be reached. Mr. Brown says, tentatively:

"I have no doubt that when the saw is run by experts for a short time, either on hard or soft wood, a time study will apparently prove that it pays. However, the real question arises, will depreciation, repairs and general up-keep offset the saving made by its speed of operation? It is my opinion that the Wolf saw is undoubtedly the best which has been developed to date and that with certain minor improvements over the saw with which I last experimented, it could be made to pay under certain conditions.[3]

"I have come to the conclusion that sawing on a yard is the proper method of approach to this problem and that none of the saws as yet developed can be made to pay in cutting down trees or in sawing at the stump, since this involves too much waste of time in the process of moving the saw about from one cut to another. Therefore, it is my opinion that experiments should be made on yards until the saw is developed which can be shown conclusively to be practical under these conditions. Then it will be time enough to work toward the development of a power saw which will cut down trees and cut up at the stump.



(From Russian magazine "Forestry and Forest Exploitation")

Fig. 2.—"Cradle" for bucking small logs into cordwood or pulpwood by motor saws. (Dimensions are shown in centimeters.)

[3]These improvements have been made already. A. K.

"In most cases it will be found that four men are necessary for an efficient crew on the yard in order to run this saw, place the wood on the skids and clear it away after it has been sawed. However, this cannot be made a set rule. There should be enough wood hauled to the yard to keep the saw busy at all times."

In this trial the Wolf saw was used continually and without major breakdowns for three months in bucking softwood logs into 4-ft. pulpwood bolts on a yard, this work being done by average woodsmen, under actual operating conditions. The output of a four-man crew in bucking pulpwood was more than doubled as compared to the hand work.

Trials of motor saws conducted in eastern Canada by several pulp and paper companies also suggest that this machinery has the best chance when bucking logs at the yard.

In bucking logs of small size into short lengths by means of a motor saw on a yard or at landing, it is sometimes practical to bundle them and buck the whole bundle. This idea has been favored by some of the Canadian pulpwood operators. It may be illustrated by an abstract from an article by P. M. Barchugov, in the September, 1933, issue of the Russian magazine *Forestry and Forest Exploitation.*

"The following efficient practice of bucking small timber by motor saws with the help of special frames or 'cradles' (Figure 2) has been developed by the Berest Station for Improvements in Logging Methods. The number of frames required is determined by the lengths of the logs to be bucked and

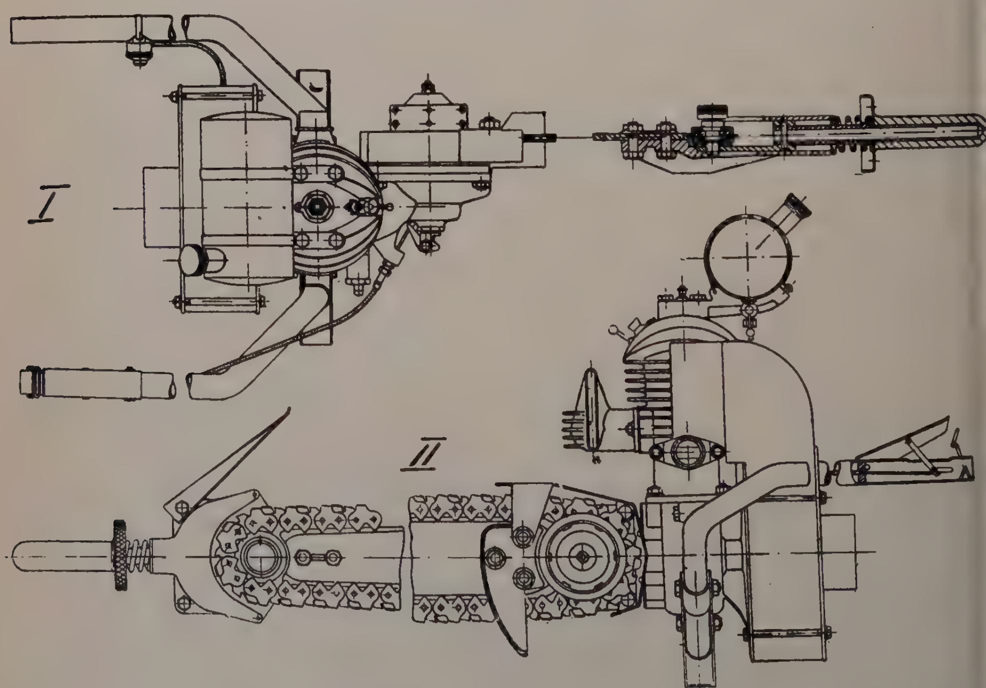


Fig. 3.—Soviet chain motor saw. Uvarov model No. 1.
(I, top view; II, side view.)

the distance between the cuts. Logs are loaded into the 'cradle' between the stakes of its frames and one cut is made midway between each two frames. To eliminate pinching of the saw the bottom cross-pieces of the middle frames are 4 inches higher than the others and consequently the ends of logs overhang; if the saw pinches in spite of this, a workman uses a small lever to raise slightly the logs involved. A motor saw makes a cut through the whole pile of logs, 20 inches wide and 3 feet high, in from one to three minutes. With three 'cradles' each made up of 4 separate frames, the crew consists of seven men; 2 men operate the saw, 2 others remove and pile the bucked wood, and 3 men to load the empty cradles with logs. In winter a motor saw may be operated almost continually but in warm weather it must be stopped every 20 or 30 minutes for intervals of from 5 to 10 minutes for cooling off."

The following is an abstract of the Russian article by "S. E." entitled "Soviet Chain Gasoline Motor Saw," in the December, 1933, issue of the same magazine:

"The first part of the article deals specifically with the faults found in the construction of the German-made 'Dolmar,' 'Stihl,' 'Leitz' and 'Rinco' motor saws through their tests and use in Russia. On the basis of a thorough study of foreign-made motor saws, minimum requirements were listed for Soviet models for the guidance of the inventors. This work was directed and promoted by the All-Union Competition on Rationalization and Invetions. The Committee of this organization on motor saws has chosen from new Russian designs Uvarov's model which, according to this article, embodies the good features of other motor saws without their faults. The article contains specific reference to this matter, but because of the limited space we will not go into the technical details here. Figure 3 represents the second (lighter) variant of the Uvarov saw.

"In spite of the effective steps taken in recent years for increasing the efficiency of felling and bucking timber by hand, the average output of a sawyer, with an 8-hour working day, in the U. S. S. R., is from 5 to 6 cubic meters (without peeling). The experience with foreign-made motor saws in logging operations indicates that in felling and bucking by this machinery (in spite of imperfect organization, the great weight of these saws, the imperfections of their construction and the inadequacy of the operators), the production per sawyer has been increased to 8 cubic meters per working day.

"The analysis of time studies with foreign-made motor saws leads Russians to the conclusion that the use of the new Soviet model will increase the sawyer's output over that with foreign-made saws by 30 or 35 per cent, due only to the mechanical advantages of this saw and its lesser weight. The estimated production with the Uvarov saw per 8-hour day should be, on the average, 10 or 11 cubic meters of logs per sawyer—almost double that in hand operation. After making allowance for the cost of sawyer's labor per working day with a motor saw being 50 per cent higher than in hand work and taking into account all such expenses as amortization, repair parts and repairs, fuel and lubricants and higher wages for saw mechanics, the cost of work per cubic meter of wood still will be 25 per cent less than that with hand work.

"Among German-made motor saws the Leitz model is much lighter than Rinco of equal power; but the first, in spite of this advantage, is inadequate for emonomic use in Russia because of imperfections of construction. In Uvarov's

model (Figure 3) advantage is taken of the use of light alloys, electric welding and high quality steel instead of cast iron parts. Its specifications are: Weight, without fuel, about 28 kgs. Maximum cut, 60 cm. Thickness of the chain saw (kerf) 8½ mm. Gasoline motor (1 cylinder, 2 cycle) about 4 h.p., 2,800 to 3,000 revolutions per minute. Expected speed of sawing is (with unfrozen logs of pine or spruce 35 or 40 cm. in diameter and for sawing proper), about 30 cms. per second.

"The use of a more powerful motor than the above would necessitate considerably greater weight to provide for adequate strength of the machine, while at least 3 h.p. are required for efficiency of work with fairly large or frozen logs. While the Uvarov motor saw weighs 36 per cent less than the Leitz and 47 per cent less than the Stihl, which was imported into Russia in considerable numbers and is one of the lightest motor saws, it is expected that further reductions in its weight will be feasible."

Of course only experience will show whether the Russians are too optimistic about their new model of motor saw.

The writer's impression, based on considerable information from various sources, is that even at present the best among the available motor saws should have commercial possibilities in logging here, under suitable conditions and with proper organization. If our economic conditions continue to improve, motor saws will probably penetrate into our woods operations very shortly. Meanwhile, perhaps the subject could be studied by the U. S. Forest Service or some other organization.

A PORTABLE GASOLINE-DRIVEN SAW FOR FELLING AND BUCKING

By C. EDWARD BEHRE and L. H. REINEKE

Northeastern Forest Experiment Station.

THE following notes report the results of a demonstration of the Wolf Portable Timber Sawing Machine recently given in northern hardwoods at Bartlett , New Hampshire, by the Reed-Prentice Corporation of Worcester, Mass., at the request of the Northeastern Forest Experiment Station.

Description of Saw

The Wolf Portable Timber Saw has been on the market since 1927 and has been successfully used with electric or compressed air power in a large number of industries. The gasoline engine unit has been especially developed to adapt this saw for woods work. The Wolf chain saw operates in a hardened steel, self-lubricating frame. It is driven through a clutch by a two cylinder, air cooled motor developing 7 to 8 brake horsepower, controlled by a motorcycle type throttle. The saw may be used in horizontal, vertical, or oblique positions so that it is adaptable to notching, undercutting, felling, and bucking. The position of the saw with respect to the engine is readily changed without tools by the operation of a simple clamp around the gear housing. The saws are manufactured in 3 interchangeable sizes with capacities of 16″, 24″, and 36″. The weight of the machine in these 3 sizes is 70, 73, and 85 pounds respectively.

The saw is operated by two men and best results are obtained by applying considerable pressure and rocking the saw slowly from one side of the cut to the other.

Bucking Northern Hardwoods

The demonstration on the Bartlett Experimental Forest was largely in the bucking up of northern hardwoods for fuelwood. Time was taken with a stop watch on a total of 70 cuts; 31 in beech, ranging from 4″ to 28″ in diameter; 22 in sugar maple from 3″ to 10″ in diameter and 17 in yellow birch from 4″ to 8″ in diameter. In addition to actual sawing time a record was kept (1) of time consumed in starting the engine and in moving from one cut to the next, but not for moving from tree to tree, and (2) of time lost through stalling of motor, pinching in cut, etc. The record for the 70 cuts is shown in Table 1.

Figure 1 shows the relation between size of cross section and time required for sawing. It appears that up to about 14″ or 15″ in diameter, the time required is directly proportional to the cross sectional area, about 28 seconds being required per square foot sawed. For larger sized cuts there is a considerable increase of efficiency, 20-inch cuts requiring 22 seconds per square foot and 28-inch cuts only about 16 seconds per square foot. A hardwood log 14″ in diameter may be cut through in about 30 seconds and approximately 1 minute is all that is required to saw through a 24-inch piece, provided no time is lost through binding.

It was observed that time in moving and in lost motion was relatively greater for the cuts of small diameter than for the larger ones, but as an offset the large cuts might often require more time in

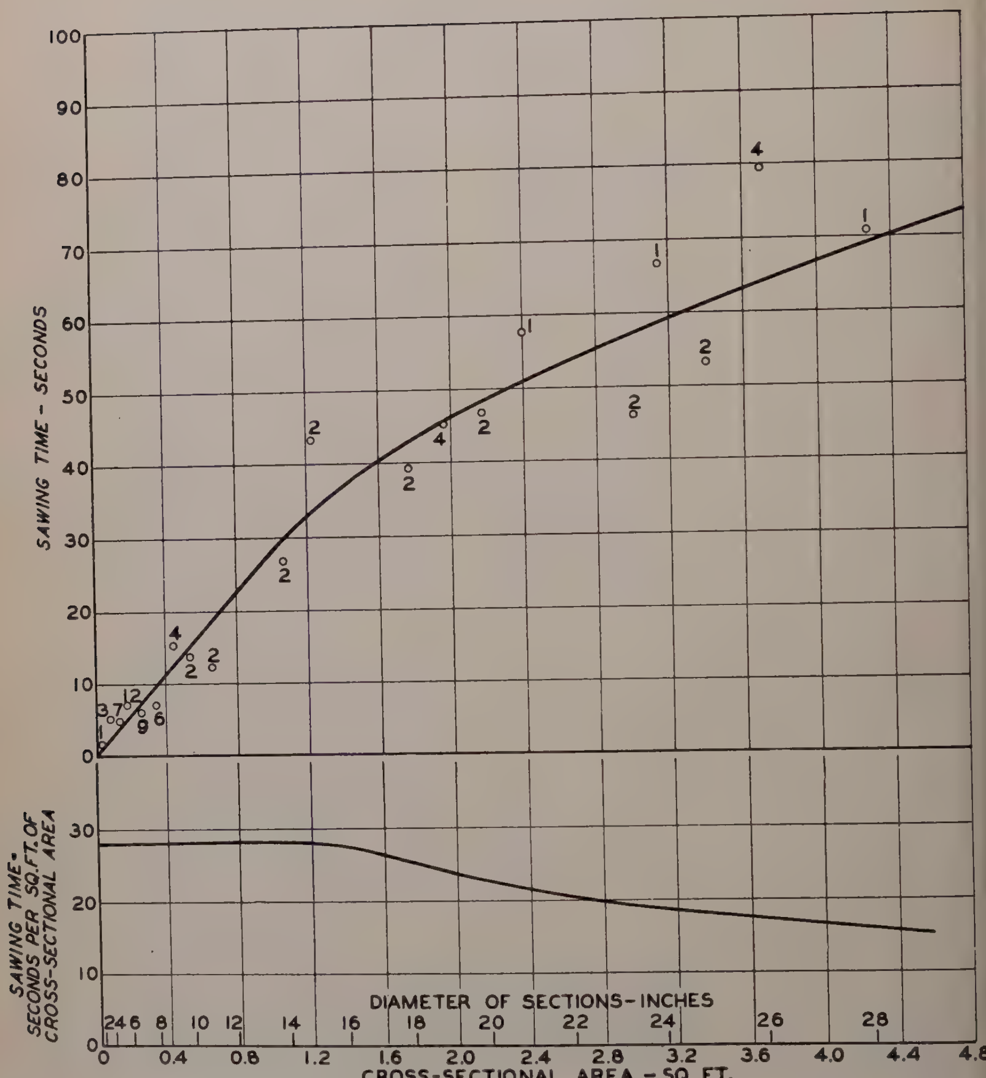


Fig. 1.—Time study of the Wolf Portable Timber Sawing Machine in bucking northern hardwoods. Demonstration at Bartlett, N. H., Oct. 10, 1933.

preparation to prevent binding. The machine was operated by a number of men who had never handled it before and all agreed that with a little practice efficiency could be greatly increased.

Felling

The saw was demonstrated in the felling of two large, sound beech trees, both of which could be handled without resort to wedging. One of these averaged 22.5″ in diameter at the point of cutting. The time required to bring it down (excluding a delay on account of running out of oil) was as follows:

Undercutting with Wolf saw	1 min. 15 sec.
Lost time	20 sec.
Taking out notch with axe	30 sec.
Making ready for main cut	25 sec.
Main cut	2 min. 35 sec.
Total	5 min. 5 sec.

The second tree averaged 33″ in diameter at point of cut. A notch 12″ deep at the widest point was made, using the Wolf saw for both diagonal and horizontal cuts. In felling, a band of wood 4½″ wide broke off, leaving a net area of sawn stump of 4.13 square feet. The total time getting this tree down was 7 minutes, 14 seconds, of which 4 minutes and 29 seconds were required for the sawing itself and the balance in preparation and lost time.

In the first case the total time required for felling was 1 minute, 55 seconds per square foot cross sectional area, and in the second case it was practically the same, namely 1 minute, 57 seconds. It may be concluded that large hardwoods can be felled at a rate of 2 minutes per square foot of stump, not counting time moving from tree to tree.

Observations

From this brief demonstration it would appear that the Wolf Portable Timber Sawing Machine may be efficiently operated by a three-man crew. Two men are required to handle the saw and the third to do wedging, blocking in preparation for bucking, and swamping. Swamping is reduced to a minimum because the machine can be used to remove large branches. The machine is not difficult to handle. For bucking it may probably be used with greatest efficiency at yards to which the logs are brought in long lengths by teams or tractors. Its use for felling may be limited by the impossibility of wedging until the saw has advanced about one foot into the cut. Providing a special jack to take the place of a wedge may obviate this difficulty to some extent.

The machine should prove extremely useful on any operation where trees are to be cut into short lengths in large quantities, as for pulpwood, small dimension stock bolts, fuelwood, etc. Where the timber is customarily cut into 4-foot bolts only to be split and worked up into shorter lengths later, it may prove economical to cut it into the lengths finally required with the power saw in the first place, and thus reduce the labor of splitting and extra handling.

Table 1

RECORD OF CUTS

	Total	Average	Percentage of total
Cross sectional area cut, square feet	70.9	1.012	
Time for starting and moving from cut to cut	17 min. 17 sec.	14.8 sec.	31
Sawing time	26 min. 19 sec.	22.6 sec.	47
Lost time	12 min. 18 sec.	10.5 sec.	22

SURVIVAL OF HEART ROTS IN DOWN TIMBER IN CALIFORNIA

By ERNEST WRIGHT

Bureau of Plant Industry, San Francisco, Calif.

BOYCE (1), Fritz (2), Weir (3 and 4) and others have shown that heart rots may continue to live in coniferous timber after the infected trees have been felled or wind thrown. The determinations were based on the sporophores produced from the rot present in the logs. The age of perennial sporophores may be taken as approximating the length of time that the rots have survived in down timber. In the case of annual sporophores, which are characteristic of certain heart-rotting fungi, it is necessary to determine how long the trees have actually been down.

In the Sierra Nevada Mountains of California the dry climate of the summer season is not generally conducive to the survival of heart rots in down timber. The following observations, however, show that heart rots do continue to live for a longer time in this region than is generally realized.

Fomes laricis Rot

Two sporophores of the chalky quinine fungus (*Fomes laricis* (Jacq.) ex Murrill) were found on a 30-foot log of *Pinus ponderosa* Dougl. at an elevation of 6,300 feet near Lake Tahoe. This log was 38 inches in diameter at the butt end. One of the sporophores was located on the cut surface of the butt end of the log and the hymenial layers of both had developed horizontally showing that they were produced after the tree was felled. The other sporophore was located on the side of the log 20 feet from the butt end. The sporophores were typical for this species and approximately 7 x 12 inches in size. Thirteen growth layers were counted on each sporophore. Since each layer is normally annual, it is probable that the heart rot in the log remained alive for some thirteen years after the tree was felled or perhaps longer, as the sporophores may not have appeared until the log had been down for several years. By inquiry from local old-time loggers it was learned that the tree was felled 37 years before these observations were made. The log was badly decayed at the time of observation.

Echinodontium tinctorium Rot

On another area in the same region, three sporophores of the Indian paint fungus (*Echinodontium tinctorium* Ell. & Ev.) were found on the cut ends of three logs of *Abies concolor* Lindl. & Gord. located under heavy shade. The logs measured from 5 to 12 feet in length and from 10 to 15 inches in diameter and had been cut from different trees. No accurate count of the layers on the sporophores could be made but judging from their size and appearance they had undoubtedly grown for a number of years. The position of the sporophores left no doubt that they were produced after the trees were felled and bucked. These trees were part of a group felled 20 years previously in the course of an investigation made by this office.

Polyporus amarus Rot

About 150 miles farther south in the Sierra Nevada Range and at an elevation of 5,000 feet, a fresh sporophore of the incense cedar dry rot fungus (*Polyporus amarus* Hedg.) was found on a 40-foot log of *Libocedrus decurrens* Torr. This sporophore was located on the under side of the

log, with the hymenium almost touching the ground. It had come out 10 feet from the butt end where the log measured 42 inches in diameter. The area had been logged eight years previously. Since the sporophores of *P. amarus* are annual and generally quickly destroyed, it is quite possible that other sporophores have been produced during the eight years although no remains of old sporophores were found.

Estimation of Rot Survival

The rots reported upon were present in every case before the trees were felled. This was evidenced by the corresponding decay found in the stumps or in the case of white fir logs was supported by the definite records made during the previous study already mentioned.

Sporophores of heart-rotting fungi, particularly *P. amarus,* are also frequently found on wind-thrown trees. As a rule, it is difficult to determine how long such trees have been down or to make sure that the life of the trees terminated immediately after falling. Unbroken roots extending from the soil may make it possible for a fallen tree to live for a number of years so that the production or growth of sporophores may continue under such conditions in almost the same way as when the tree was standing.

Suggestions for Control Measures

All the logs observed were located under approximately similar conditions near streams or swampy land where humid conditions prevailed. These conditions are apparently favorable to sporophore production in this region.

If sanitation measures, such as the felling of badly decayed trees or those bearing sporophores of heart-rotting fungi, are to be completely effective, it appears that special precautions to facilitate rapid drying of the down cull material will be necessary in moist or protected situations. Rapid drying out of logs would prevent the formation of fruit bodies from heart rot already present. Drying will proceed at a faster rate in logs of large chunks lying in the open away from thickets and exposed to sun and wind action. Drying also takes place more rapidly in logs lying on dry rather than moist ground. Cull material located near streams or swampy areas could be felled away from rather than towards the moist ground and in so far as possible the cull logs should be left in the open. If it is necessary to leave them on moist ground or in protected situations, the chances for subsequent sporophore production from them may be lessened by reducing the bulk of the individual pieces to hasten drying. This may be done by bucking them into short lengths and rolling these apart or by other means such as splitting with light shots of dynamite.

Attention to the conditions under which logs with heart rot are left in the woods should reduce fruit-body production very materially. Especially would this be true in logging operations in the Sierra Nevada Mountains of California.

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THE NEWEST MAP OF THE OLDEST BRITISH COLONY

By JULIAN E. ROTHERY

The geography and resources of Newfoundland are by no means as well known as those of nearby Canada. The following is condensed from an article in the Geographical Review *for October, 1933, published by the American Geographical Society of New York. The complete article treats in detail with the construction of the map and gives a brief summary of the mineral resources of the island.*

ANGLO-AMERICAN history may be said to have commenced on that August day in 1497 when John Cabot, a Venetian navigator, sailing from Bristol, England, under letters patent from Henry VII "found the New Isle" and "opened the side door to North America."

The location of Newfoundland is highly strategic in reference to the Old World, as witness the cable landings, steamer lanes, and airplane crossings of today, while to the New World it stands fair in the mouth of the great transverse waterway of the St. Lawrence, or the "Gulf of the River of Canada," as it was so graphically described by Captain John Mason, a governor of the colony, on his map printed about 1625. Naturally the island was destined to figure in the voyages of many of the early French and English discoverers who sought the Northwest Passage or who pushed up the St. Lawrence to the great continental waterways beyond that were eventually to carry La Salle to the Gulf of Mexico and Mackenzie to both the Arctic and the Pacific long before the interior of the guarding island was explored.

The rocky shores, however, were well known in the early part of the sixteenth century to the traders and fishermen of Portugal and Brittany, and the imprint of their language is discernible today on many of the capes and bays that mark the long and deeply indented coast. It was with the final establishment of English domination at the end of the French régime in Canada that Newfoundland commenced her slow settlement, confined up to the present century to a thin fringe bordering the sea, which was and still is the main factor in her economic life.

The first extensive exploration of the interior was undertaken by W. E. Cormack in 1822. Cormack, a Prince Edward Islander with an inquisitive mind and an interest in the Beothics, the original Indians, and the Micmacs, who came from Nova Scotia and exterminated them, started in at Trinity Bay and for fifty-odd days marched steadily westward to emerge from the wilderness at St. George Bay on the west coast. The curious thing about Cormack's march is not that it yielded rather barren results but that it was the first inland exploration in the three centuries that had elapsed since the shores were fairly well known.

Its true perspective is seen when we realize that La Verendrye from Three Rivers, Quebec, had pushed westward to the Rocky Mountains in 1743 and that Lewis and Clark had forced their way across the great mountain wilderness in what is now central Idaho and reached the mouth of the Columbia 17 years before Cormack started his track. Rogers in his "Historical Geography of Newfoundland" (1910) says of Cormack's journey, "It was the first long walk in Newfoundland and it was almost the last," and until the various surveys I am going to describe were made little indeed was known of most of the interior.

Inland Settlement and Exploration

The railroad spanning the island like a

horseshoe from St. Johns to Port au Basque was only completed in the nineties, and it gave to Newfoundland its first inland settlements, chief of which was the paper mill built by Lord Harmsworth at Grand Falls on the Exploits River (1905). The second marked industrial advance came in 1923, when ground was broken for the great modern newsprint mill (Newfoundland Power & Paper Co.) at Corner Brook on the Humber Arm in the Bay of Islands, a project backed by the British and Newfoundland governments.

Soon after this the forest resources of the island were brought to the attention of the International Paper Company, and in 1927 the writer was engaged to report on a number of extensive pulpwood tracts located in various parts of the island and aggregating about 4500 square miles. After the completion of this work the company acquired the development at the Humber Arm and 2700 miles of woodlands other than that surveyed in the first instance. An active acquisition program called for still further surveys so that in 1931 the company was in possession of surveys of a greater or lesser intensity, covering somewhat over 12,000 square miles, or approximately 30 per cent of the island's total area of 42,734 square miles.

As a considerable amount of the wood will be taken to the mill from the outlying properties by steamship, a reliable map of the littoral that would also set forth the known topographic features of the interior of the island as a whole became desirable. No existing map combined these features. The British Admiralty charts and the U. S. Hydrographic Office charts furnished good data for the shore line, though, as will be explained later, certain adjustments were required. Of the hinterland beyond there was no accurate map extant. Large areas were unknown except to the "furrier," as the trapper is called in Newfoundland, and considerable information in the files of the government and various private concerns was not in final form.

Thus it was that presentation of the forest resources of a large paper mill led to the compilation of this newest map of the oldest colony of Great Britain and the tenth largest island in the world. The task was unusual in forest engineering work in that it covered an entire political and physical domain.

Forest Conditions

In various sections of the island some local features of the forest will constantly remind one of the Nova Scotian coast or the North Shore of the St. Lawrence or again of the northern plains of Ontario, but taken all together the forest conditions are different from any of these and distinctive in themselves.

The grassy and mossy barrens and the muskegs, which cover a tremendous area, are probably caused by poor drainage and a deficiency of soil in the hard granite and gneiss areas with the result that sour vegetable matter or peat forms, giving rise to the typical flora of the barren lands.

The forest itself may be roughly divided into two zones, the sub-Arctic on the North Peninsula and what may be called an extension of the eastern coniferous or Laurentian zone in the central section. The former is characterized by a mixed stand of spruce and balsam in varying percentages, interspersed with white birch and poplar, while the latter is marked by the presence of some white pine and occasionally on the better soils, as in the flats and gullies of the Long Range, by yellow birch. Cedar, hemlock, red pine, jack pine, and the extensive stands of tolerant hardwoods, maple, and yellow birch, typical of the Laurentian and southern section of Quebec, are lacking.

Black spruce is prevalent in the poorly drained areas and merges into the upland

or slope type of the same species or possibly the red spruce on the better drained sites. Balsam is widely distributed, with a heavy percentage particularly in the western section, occurring both in mixed and pure stands. Small amounts of white spruce were noted in the central part of the island. The scattered white pine, approaching light stands in some places, is no longer an important tree, though formerly it was cut in substantial quantities by mills on the north and west coasts.

Because there is little natural competition from tolerant hardwoods and the forest is essentially of a coniferous composition, the reproduction and young growth are usually well founded and persistent. Old burned areas often spring up to softwood stands, predominatingly spruce, and restock with vigor and completeness.

In distribution and volume the forest again shows great fluctuation. Three-quarters or more of the gross area of tracts of 100 square miles and more may support a well timbered commercial forest, a proportion comparable to the better-forested areas of Canada. From this mark, however, the distribution may fall to scattered patches and fringes bordering the water-courses and so interspersed with barrens as to comprise but a small per cent of the total area within a drainage basin.

Stands may again vary greatly in the proportion of spruce and fir and also in density. Tallies of 3000 cubic feet per acre, or even more, were noted on the North Peninsula, while 200 miles farther south, still in virgin forests, there were instances where tallies showed but a fraction of this amount, probably because of soil rather than climatic conditions.

Burned lands are not common, contrary to the impression gained in riding over the railroad, along which, unfortunately, the most extensive burns are conspicuously strung. Away from the railroad, on the other hand, one area of more than 600 square miles was thoroughly explored without disclosing any recent burn.

The dominant species, spruce and fir, are generally sound and thrifty, and, while good-sized trees 18 to 20 inches in diameter are occasionally encountered on the best sites, the average is generally 6 to 7 inches in diameter, a class of material essentially suitable for pulpwood.

Land Tenure

Title to most of the island is still vested in the Crown, but there are numerous extensive grants of freehold lands, for the most part issued as subsidies for construction of the railroad. Of the Crown land, nearly all of the large areas of good timber are under license to paper mills or other licensees.

At many places along the shore, lines generally parallel with the trend of the coast and several miles from it indicate the rear boundary of the "fishermen's reserve," a strip still held by the Crown for the benefit of the villages and fishermen along the coast, for in Newfoundland fish come first, now as ever they did.

While we feel that the map presents by far the most complete and reliable data to be found anywhere today, on account of the broken and diverse nature of the terrain and the forest which it supports aerial photography will be extremely useful in the future mapping of the "New Isle."

PRACTICES AND PROBLEMS IN THE DISPOSAL OF BRUSH RESULTING FROM THINNINGS IN PONDEROSA PINE IN THE BLACK HILLS NATIONAL FOREST[1]

By THEODORE KRUEGER

Forest Supervisor, Black Hills National Forest

This paper outlines what its author believes to be a practical compromise between the prohibitively expensive ideal of complete brush disposal, and the other impossible extreme of no brush disposal at all on the 50,000 acres of second-growth pine in the Black Hills, which will have been thinned by the E.C.W. and N.I.R.A. before the spring of 1934, and which will present to the national forest officers a new problem in fire prevention.

IT IS expected that in connection with E.C.W., N.I.R.A., and other stand improvement cuttings there will be a total of approximately 50,000 acres of thinned stands in the Black Hills region by the spring of 1934. These areas in which thinning operations are carried on consist of stands of trees from 5 feet to 30 feet in height and up to an average of 5½ to 6 inches in diameter, and contain from 2500 to 10,000 and more trees to the acre. The larger part of the work is in stands averaging 4000 trees to the acre with an average diameter of 3 to 4 inches, and 14 to 20 feet in height. Depending on the height of the trees to be left, the average spacing desired is:

6x6 feet or 1200 trees per acre for stands up to 6 feet in height.

8x8 feet} or 680 to 540 trees per acre for
9x9 feet} stands 6 to 15 feet in height.

10x10 feet or 435 trees per acre for stands 15 to 30 feet in height.

These thinning operations leave a tremendous amount of brush and slash on the area and proper brush disposal becomes a matter of importance since the brush left on the ground creates a fire hazard which is greater than has ever been experienced in the Black Hills. The average number of fires within the Black Hills and Harney National Forests for the past four years is 69 per cent (32 Black Hills and 37 Harney). Of these, about 55 per cent are caused by lightning.

One group of extremists believes that in order to have proper fire protection all brush resulting from thinnings should be burned, while some other radicals believe that cutting the trees is all that is needed and that any lopping done is a waste of time, it being their contention that the higher the branches are, the faster the needles fall off.

I believe that both of these extreme views are wrong, the first because it is too costly and destroys a large amount of material which should go back to the soil as humus, and the second because it entirely overlooks local conditions in fire control. We find that for proper fire suppression we must keep the flames as low as possible to keep the fire from crowning, and secondly we must be able quickly to build a control line around the fire. Neither of these can be done when the brush is left waist high without lopping or cutting in two the longer poles.

When deciding on a proper method of brush disposal in thinning areas, the following factors must be taken into consideration:

[1]Presented at meeting, Central Rocky Mountain Section, Denver, Colo., November 21, 1933.

1. The fire hazard.

2. Effect of method selected on the public's confidence in the Forest Service which we have been 25 years in building.

3. Effect on attitude of fire wardens and coöperators after E.C.W. camps are disbanded when they must assume the responsibility for first line attack on fires.

4. Heavy investment per acre of thinned areas. (With our N.I.R.A. crews paid 50c per hour, and leaving the brush 24 inches high, the cost per acre is about $12.)

5. Justification of cost of the method selected.

6. Any serious hazard to fire fighters.

Different "degrees" of brush disposal have been tried out as follows:

1. Complete burning of all slash.

2. Complete trimming to a point in the top where diameter of stem is 2 inches and the stem cut into 8 to 10 foot sections.

3. Parallel felling and trimming to the extent necessary to get brush below 24 inches high (except trees less than 4 inches d.b.h. and 12 feet tall).

4. Parallel felling and merely lopping an occasional top.

5. Parallel felling but no further attempt at slash disposal except cleanup to 25 foot width along all roads passable to automobiles.

6. Parallel felling only with no lopping of branches.

After considerable experimenting some conclusions have been reached as follows:

1. Complete burning of all slash and the other extreme of leaving untrimmed brush waist high have been eliminated.

2. Brush disposal is not a serious problem in the thick stands of spindling trees of ponderosa pine where the trees are less than 3 inches d.b.h. and 15 feet or less in height, but it does become a problem in the larger stands where the brush often piles up waist high.

It is expected that the winter snows will flatten much of the brush and that after a period of four years most of the needles will have dropped off, although the fire hazard will remain for years after needles have fallen off.

At the date of writing this paper our brush disposal practice in thinning areas of ponderosa pine in the Black Hills is as follows:

1. Tops of trees 20 feet or less in height are lopped only to the extent necessary to keep the slash within approximately twenty-four inches of the ground.

2. Trees exceeding 20 feet in height which will not be utilized by free users or trees which will fall in openings are cut off at approximately the point where the green branches begin, the aim being to keep the remaining brush not over 24 inches high.

3. All slash less than approximately 3 inches in diameter at the base located within 100 feet of main highways and important secondary roads is piled and burned. (It is expected that poles larger than 3 inches in diameter on cleaned strips along these roads will be hauled out by farmers for fire wood, corral poles, etc.)

4. All slash less than approximately 3 inches in diameter at the base located within approximately 25 feet of truck trail and the more important ways passable by automobile is piled and burned.

5. All slash is kept out of a strip 6 to 10 feet wide along the tops of ridges, trails, and old haul roads so as to leave no area of over 10 acres without a break for fire control.

6. In accessible areas where it is known that the poles will be hauled out by farmers no lopping or refinement in brush disposal is needed as generally the

farmers will lop out the tops to a 2-inch top.

7. It is expected to pile and burn all brush for a safe distance around towns, campgrounds, summer homes, and other places of human habitation.

Observations in old cutting areas where tops were left unlopped show that needles of unlopped tops will remain for a period of four years and that even after six years the slash is a serious fire hazard.

While the above present practice of brush disposal is a big step in the right direction, I believe that we should go just a little farther, and cut all trees over *15 feet* long in two, instead of trees over 20 feet.

I believe that the added cost would be fully justified in fire control by:

1. Keeping the flames lower.
2. Increased rapidity in building fire line.
3. Ability to take men closer to the fire to build fire lines.
4. Added safety for fire fighters.

However, even by leaving brush not over 18 inches high, and with other precautions taken, it must be fully realized that there will be a tremendous fire hazard in the Black Hills and that it will probably be necessary for several years after thinning operations stop to have special fire patrols and equipment, and to take precautions until such a time as the brush left is no longer a special fire hazard.

COMPARATIVE VALUES OF CERTAIN FOREST COVER TYPES IN ACCUMULATING AND RETAINING SNOWFALL

By W. L. MAULE[1]

U. S. Forest Service, Laconia, N. H.

Although the forest, generally speaking, has a wide range of values and uses, yet specifically no one type of forest is equally valuable for all purposes, and for a specific purpose. Some one type is usually more valuable than others. These principles Mr. Maule points out most interestingly in his report on the relative snow holding capacities of the several commoner forest types in Connecticut, where, in that region, the primary purpose is water conservation. His findings would seem to be worthy of careful consideration.

A STUDY was made during the winter of 1932-33 of the accumulation of snow and its melting rate, in various forest cover types found in the vicinity of New Haven, Connecticut. The study was made in six different forest cover types—hardwood, white pine, red pine, Norway spruce, and open. The object of this study was to determine the average depth and water content of the snow, the melting rate, and the time the snow was retained under the different cover types.

The water content of snow can be determined by removing a core of known volume for melting. To speed up the field measurements, the "weight method" was developed in which the volume and weight of a snow core can be converted to its water equivalent. Several snow samplers of this type have been developed, notably that designed by Horton and introduced in 1905 by Dr. Frankenfield of the U. S. Weather Bureau, the Mount Rose Sampler of Church (1), and the improved design of Kadel (2), and others.

Blue prints of the approved Kadel design were secured from the Weather Bureau and a snow sampler tube constructed from them by local artisans. A description of the tube may be of interest. The snow sampler was made of 20-gauge seamless steel tubing, with an outer diameter of three inches and a length of three feet. Longitudinal slots 3/16 inch wide and 8 inches long were milled, spaced 1½ inches apart, along one side of the tube to facilitate cleaning in case the snow core stuck in the tube at the time of sampling. The tube had inch and half-inch graduations with appropriate numbers to show depth. Attached to this tube and forming a part of it is a special cutter with an inside diameter of exactly 2.655 inches. Kadel (2), in devising this form of snow sampler cutter, found that with a diameter of 2.655 inches one-fifth (1/5) of a pound of snow is equal to one inch of water equivalent. The special cutter was constructed with an inside shoulder one-half an inch above the cutting edge which wedged the snow in the tube so that a core can be removed from the snow field without losing any portion of it.

An ordinary spring balance was substituted, because of the high cost of the special snow scale designed by the Weather Bureau, for measuring the water content of the snow. A circular chart was made on which pounds and ounces were converted to read in inches and tenths of inches of water equivalent. This special chart was then securely and accurately fastened over the graduated face of the balance. This arrangement made a very satisfactory substitute for the more expensive scales used by the western sta-

[1]Condensed from thesis submitted to the Yale School of Forestry, while on leave of absence from the Forest Service.

tions of the Weather Bureau.

The method used to measure the snowfall was as follows:

As soon after the snow ceased to fall as was practicable all the stations were visited to record the depth of snow and its water content. The balance was hung in a convenient place, the tube was placed in the balance cradle and its weight marked with the tare weight indicator, the tube was then introduced in a vertical position into the snow, the depth read from the scale on the tube, then the tube with the snow core was removed from the snow field to be weighed. The weight of the tube with the snow minus the weight of the tube gave the water equivalent of that depth of snow. This weighing procedure was repeated at all the stations. To check this tube method a core of known volume of each snowfall was melted in a cylindrical vessel. The resulting water was then measured for depth to find the water content of that core.

It was found difficult to measure accurately the water content of shallow depth snowfalls with the snow sampler tube, hence the use of the melting method. Some investigators use a known volume of hot water for melting a snow core when using the melting method. I used, in the field, the heat from the automobile exhaust pipe or manifold for melting this snow core. When using heat other than a known volume of hot water care must be taken that loss through evaporation does not result.

The region about New Haven is gently rolling, with here and there abrupt ridges rising to a height of several hundred feet above the sea. The region is plentifully supplied with springs and streams, many of which are utilized for water supply purposes. It is a region of light snowfall and due to its proximity to Long Island Sound the snows do not last for long periods of time. The seasonal snowfall of New Haven, Conn., according to information furnished by the local Weather Bureau meterologist, was approximately ten inches less for the period of December, 1932, to March, 1933, than that of the mean, the 1932-1933 snowfall being 28.8 inches and the mean, of the year since 1872, being 38.5 inches. The fall of this past winter was greater than that of the past five years, or since the winter of 1926-1927 when 34.6 inches was recorded.

Measurements of the average light intensities, by means of the Clements Photometer, were made in the different cover types and age-classes to determine the amount of light passing through the canopies that could affect the melting rate of the snow. Table 1 shows the light intensities in the different cover types.

Photographs illustrating the density and condition of the different stands are omitted because of lack of space.

Description of Stations

Stations were located in the following types and in various age-classes:

White pine, red pine, Norway spruce, hemlock, and hardwood.

The white pine, red pine, and Norway spruce stands are plantations of the 11 to 20 year age-class, while the hemlock is uneven-aged. The hardwood stands range in age-classes from 1 to 20, 41 to 60, 61 to 80, and uneven-aged.

The Report of the Committee on Forest Types, Society of American Foresters, was used to determine and classify the forest cover types. All the hardwood types considered in this study fall within their Cover Type 49, having a composition of white oak, black oak, and red oak predominant, usually with a small admixture of other species. The common and botanical names of the tree species mentioned in the type descriptions follow those mentioned in this report, except that of Norway spruce (*Picea abies*). A short description follows of the forest cover in which the observation stations were located.

Stations 1 and 1a were located in a hardwood stand that was burned in 1930.

The reproduction is principally of sprout origin with an average height of the new growth lying between 5 and 8 feet, and with an average height of 20 feet for the few trees per acre that survived the fire.

Stations 2 and 2a, 3 and 3a, 8 and 9, 11 and 13 were located in hardwood stands of the 1-20, 61-80, 41-60 and the uneven-aged classes, respectively. Stations 8 and 9 were in the 41-60 year age-class, but in stands that differed because of the silvicultural treatment and amount of wood removed per acre in the thinnings. Stations 11 and 13, in the uneven age-class, differed in treatment and in stand condition; the former had a salvage cutting in 1914 and a thinning in 1922, while the latter had selection cuttings made in 1915 and in 1920 so that now the stand is open.

Stations 4 and 4a, 5 and 5a, 6 and 6a, were located in stands of red pine planted in 1916 with 2—2 stock, Norway spruce planted in 1913 with 2—1 stock, and white pine planted in 1913 with 2—1 stock, respectively. The spacing used in all cases was six by six feet. The best dominant trees, spaced approximately 15 feet apart, have been pruned in these three plantations. No understory of herbaceous plants or shrubs is present in these plantations.

Stations 7 and 7a were in an old field. The former was planted in 1926 with red pine that now has a height of from one to four feet, with a spacing of six feet. The latter was situated in the portion of the field remaining in grass. The object of placing these stations in such a manner was to note the difference, if any, in snow retention between the open grass fields and that planted with young seedlings.

Stations 10 and 12 were located in uneven-aged hemlock stands. At station 10 there was a thick understory of hemlocks ranging in size from seedlings to small poles, in the latter the greater portion of the trees were in the dominant and codominant classes. Both of these hemlock stands had been thinned, the first in 1922 and 1929, the second in 1919.

The height of the stands in which the stations were placed is as follows:

Red pine—24 feet, white pine—26 feet, Norway spruce—30 feet, hemlock—Station 10—70 feet and Station 12—48 feet. The hardwoods varied in height from 20 feet for the 1-20 age-class, 53 feet for the 41-60 year age-class, 60 feet for the 61-80 year age-class to a range of 46 to 65 feet for the uneven-aged class.

Discussion of Data and Conclusions

All the snowfalls were recorded except those that fell in March and April, 1933. These snowfalls were not recorded because it was impossible to complete depth measurements at all the stations before melting had greatly decreased the snow depth at the locations yet to be visited in the study. The final data would have been less accurate if the records of snowfalls

Table 1

COMPARATIVE LIGHT INTENSITIES IN THE DIFFERENT COVER TYPES

Station	Types	Age class	Per cent	Station	Types	Age class	Per cent
1	Hardwood	1-20	100	6	White Pine	11-20	5
1a	Hardwood	1-20	100	6a	White Pine	11-20	5
2	Hardwood	1-20	100	7	Open		100
2a	Hardwood	1-20	100	7a	Open		100
3	Hardwood	61-80	67	8	Hardwood	41-60	80
3a	Hardwood	61-80	67	9	Hardwood	41-60	80
4	Red pine	11-20	9	10	Hemlock	Uneven	12
4a	Red pine	11-20	14	11	Hardwood	Uneven	70
5	Norway spruce	11-20	7	12	Hemlock	Uneven	13
5a	Norway spruce	11-20	6	13	Hardwood	Uneven	100

during these two months had been included, hence the omission.

The six measured snowfalls and the time of retention in days of the snowfalls at the stations located in the different cover types are plotted in Figure 1. Only the snows that ran their natural melting period or were uninterrupted by rain during their melting period are shown. The retention time of the snowfalls of December 10, 13, and 17, 1932, and of February 4, 1933, are not shown on Figure 1 since heavy rains quickly dispersed the snow. For the sake of brevity the data have been averaged by cover types.

With the exception of the snowfall of February 4, 1933, the snowfalls were light in weight, ten inches of snow being the equivalent of one inch of water. The slightly greater water content of the February 4 snow may have been due either to not taking the measurements until several days after the snow fell, or to a greater air saturation at the time of fall. A variation in temperature and wind velocity is known to affect a variation in the water content of the snow.

The lowest depth of snow at any of the stations was recorded at those in the Norway spruce cover type. This was due to the denseness of the crown and the stiffness and great number of needles on the spruce branches. While the snowfall in the spruce cover type was about half the depth of that in the red and white pine stands, it was retained for as long a period as in the red pine stand. Low wind velocity plus reduction of direct insolation upon the snow in the thick spruce and pine stands probably explains how they are able to retain the light snowfalls for such periods.

The white pine having longer and softer needles and more flexible branches than the Norway spruce or red pine allows a greater quantity of snow to reach the

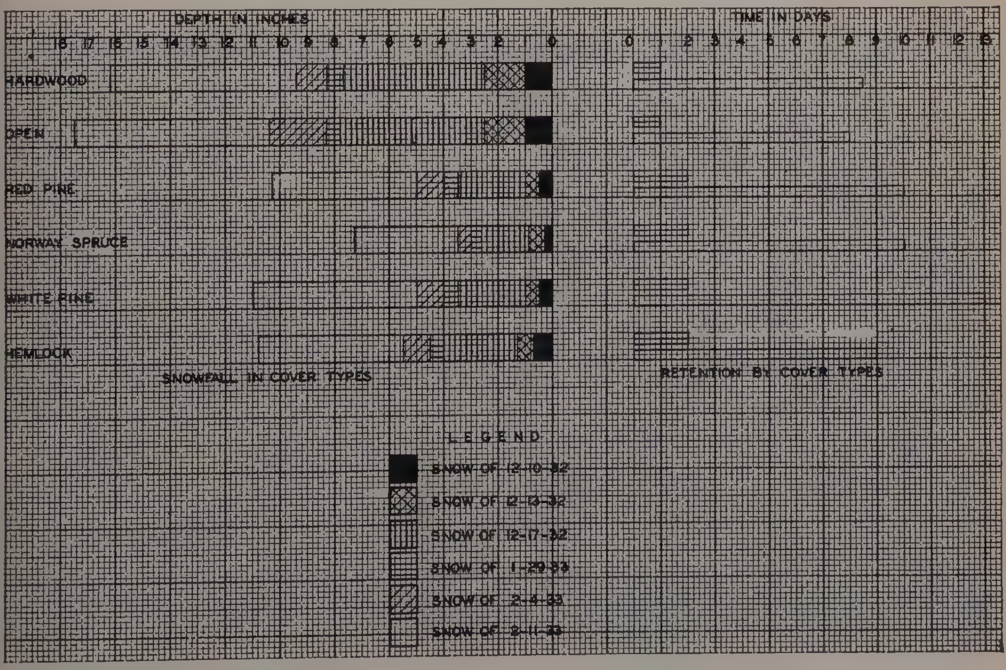

Fig. 1.—Average snowfall and snow retention by different cover types.

ground and offers better protection against direct insolation. Observations were made on depth of snowfall and trend of melting in another white pine plantation of the same age and spacing but with all the trees pruned to a height of six or more feet. The time of retention of snow in this stand was equal to that recorded at Stations 6 and 6a where only the trees spaced 15 feet apart were pruned. This observation suggests that protection by evergreen foliage from direct insolation is a more important factor in snow retention than is wind movement. Pruning of the lower branches of the white pine seems to have no detrimental effect on its ability to hold snow for longer periods than the red pine or Norway spruce stands. White pine permits, of all the coniferous species studied, the greatest volume to reach the ground and holds for the longest period the snow that was accumulated.

Red pine is superior to Norway spruce and next to white pine in its ability to hold snow for long periods. Red pine is about equal to white pine in allowing snow to penetrate to the forest floor. Its branching habit and slow lateral growth permits a greater amount of insolation on the snow that has accumulated than does the white pine.

Norway spruce, because of its comparatively short branches and stiff needles, holds a greater amount of snow in the air in a position favorable for rapid evaporation than do the white or red pine stands.

The hemlock stands apparently have little, if any more, power for preventing rapid snow melting than hardwood stands of the older age classes. It is difficult to assign a reason for this inability on the part of the hemlock to prevent rapid melting of snow, although it may be due to the uneven and broken crown formation of the uneven-age class which permits a longer period of direct insolation. Table 1 shows a higher light intensity for the uneven-aged hemlock stands than in the other coniferous stands.

In the case of the hardwoods, it was found that all stands despite their age permitted practically the same amount of snow to reach the ground as fell in the open. The hardwood stands of the different age-classes, with the exception of the 1930 burn, show a slight tendency to retard the rate of snow melting over that in the open. This tendency is proportional to the depth of the snow—the deeper the snow the greater the retention power and conversely, the shallower the snow the less the power to retain it.

In rating the different cover types on their ability, based on time, to retain snow the following would be the most logical arrangement, the type holding the snow the longest being placed first: white pine, red pine, Norway spruce, hemlock, hardwood, and the open fields. The white pine ranks first, in the case of the conifers, because of two abilities; it holds the snow the longest, and it permits the greatest depth of snow on the ground. It is suggested that these are the ideal factors when considering the kind of trees to plant on the catchment areas of reservoirs used for power or water supply.

The cover types, in the following order, allow the greatest amount of snow to accumulate, that having the greatest depth being first; open, hardwood, hemlock, white pine, red pine, and Norway spruce.

The snow density or water content was found to be practically the same in the open and in the forest. No evidence of drifting was seen at any of the stations in the coniferous cover types, and very little was discernible in the hardwood cover type.

Snow in the open or in hardwood stands, where protected from continued direct insolation by adjoining coniferous

stands, remains in considerable depth after that in the white pine stands has disappeared. Therefore, the best method of planting trees for long period snow retention may result from experimental planting of alternate rows of coniferous species and hardwoods. One of the following schemes may be of the greatest value:

The planting of two or three continuous rows of conifers and alternating with four or six rows of hardwoods, using different spacing of the conifers and hardwoods, using different species in the planting, mixing the conifers and hardwoods in the same rows to form a checker-board effect, and arranging the rows in different positions in relation to the sun's course, that is, the angle of the row arrangement in respect to the chord of the sun's path.

References

1. Church, J. E. The conservation of snow. Scientific American Supplement, Sept. 7, 1912: 155.
2. Kadel, Benjamin C. An improved form of snow sampler. Monthly Weather Rev., Oct., 1919, 47: 697.

Occasionally the timber prospector is rewarded by finding a mahogany tree with a figure or mottle. Such mahogany is much sought after for veneers, and is very rare. During my recent tour of service, when I was in charge of the Benin Circle, Southern Provinces, Nigeria, I issued a permit for a tree which afterwards proved to be particularly well figured. When a plank was cut and smoothed, it had the appearance of a rippled lake in a setting sun and was really very beautiful. One log of this fetched ten thousand dollars in the open market at Liverpool. Such a find is a great reward for industry, but it may be that there is only one such tree in five, or even ten, thousand, and there is no outward indication of the inward beauty.—*Men of the Trees* by Richard St. Barbe Baker, 1931.

BRIEFER ARTICLES AND NOTES

Stream Improvement Work in the Rocky Mountain Region

Although some stream improvement work has been attempted in New England and in the Lake States, largely through private initiative, it is not believed that stream improvement work except under the stimulus of C.C.C. and Nira activities has previously been attempted on national forest areas.

Opportunities for stream improvement work, particularly at higher elevations, appear almost unlimited in the national forest areas of the Rocky Mountain region. Such improvements appear to have many other important values in addition to their main values in increasing the fishing resources and this work should become, if funds continue to be available, an important function of land management and proper utilization of national forest resources.

With the establishment of seven C.C.C. camps upon the Medicine Bow National Forest during the past season, an opportunity for stream improvement work became available which had not previously occurred. Some minor activities had previously taken place, initiated by the local Izaac Walton League and others interested, including the Wyoming State Game and Fish Commission. Due to lack of funds, the State of Wyoming has been able to do but little in stream improvement work or rearing pond construction and have confined almost all their work to fish hatcheries.

Stream improvement work which can be undertaken on national forest areas may perhaps be classified under three types: Small stream pools built of logs or rocks designed to increase the depth of water in streams, large pools or fish ponds which form pools of water of from one-half to several acres in extent and correspond to artificial lakes, and rearing ponds in which fry are placed for a year or two before being liberated in the streams or lakes of the region.

The small stream pools appear, based on the result of the experience of 1933, to offer the most for money expended in increasing fishing facilities. The higher elevations present perhaps the best opportunities for stream pool work as there is little likelihood of floods since snow in the spring melts very gradually and cloudbursts are uncommon. At lower elevations, stream pools, especially through the heavily timbered regions, are also practicable but streams may be subject to cloudbursts. In considering the construction of stream pools, the effect of beaver ponds was taken as an index of the possibilities. There are many beaver ponds over the forest, and it seems to be universally true that where fish are caught from these beaver ponds, including eastern brook, native or black spot and rainbow trout, they are always larger than fish caught in the stream. This is perhaps due both to the increased food available in larger bodies of water including both insect and plant life as well as to the deeper waters which seem to encourage the greater growth of trout.

Stream pool work was first undertaken by several of the C.C.C. camps under plans developed on the forest. Dam construction was very simple consisting of placing two or three logs of 12″ or more in diameter at right angles to the stream,

extending the logs three or four feet into the banks to prevent side wash and tamping thoroughly with soil and rocks to eliminate lifting action by water, then lining the face of the dam and bottom of stream bed immediately in front of the dam with sod, willows or brush and covering with rocks and soil. A notch an inch or two in depth extending across the most of the width of the dam was cut into the top log of sufficient depth and width to carry the normal flow and to avoid any washing action during periods of normal flow. As a further safety factor, willow sprouts were planted above the dams on each side of the stream. In many cases mountain streams are partially dammed up by rocks in place or boulders which have fallen into the stream. The addition of a few large and small rocks frequently forms a stream pool just as effectively as the expenditure of labor in building a log dam. Usually the dams constructed of rock or logs, backed up water from a distance of 25 to 100 feet depending upon the fall of the stream and increased the depth of water from a few inches to from two to six feet. At the places where such dams have been constructed, there is little likelihood of freezing to the bottom as snow covers the region before heavy freezing takes place. Wherever such stream pools have been constructed, workmen uniformly report that as soon as the pools are finished, many trout take up their habitat immediately in the pools although few were seen prior to the construction. It seems inadvisable in view of spawning habits to back up water continuously from one pool to another, and ripples have uniformly been left between pools. During the past season when work done was largely of an experimental nature upon the Medicine Bow Forest, 95 stream pools were constructed at a cost varying from $6.00 to $8.50 depending on availability of timber, ease of digging and width of stream. Costs are based on an estimated cost of $4.00 per day for C.C.C. employes.

With the availability of Nira funds this fall for relief work, further stream pools were constructed under similar conditions. Under this program a total of 194 dams were built at an average cost of $5.50.

Two large pools or fish ponds were also constructed by the C.C.C. and formed pools averaging about two acres in area. These are rather expensive to build, requiring detailed timber and fill construction and require the employment of teams. Such ponds constructed by the C.C.C. cost about $1,100 each and will afford excellent fishing where previously only small trout could be caught.

Work in rearing pond construction was also completed by the C.C.C. during the season and further work is contemplated in the spring with the expenditure of Nira funds. Work done involved five different types of construction on five rearing ponds, depending on the individual conditions. The work done was under the direction of one of the facilitating personnel who had been previously employed as a fish culturist by the Bureau of Fisheries. Some rearing ponds were built with cement dams with sunken culvert and irrigation headgates to provide means of draining, others entirely of earth with culvert or wood pipe drainage structures, and others of log bent frame construction. One dam constructed of the log bent frame type and provision for drainage with wood box under the dam and a wood box upright draining into this above the dam, cost approximately $750.00. This has a capacity of approximately 25,000 trout to remain in the rearing pond for a two-year period before liberation in streams and lakes.

Aside from stream improvement work proper, advantage was also taken of work done in erosion control. On Sourdough Creek, the scene of a disastrous fire in

1930, which completely burned out the watershed, 57 dams both large and small were constructed across the main stream. Only a small amount of water is found in the creek during the summer season, and there were no fishing possibilities. Rainbow trout have now been planted in these ponds and in a few years, it is expected to have excellent fishing where there was none before.

Many of the lakes of the timber line region, formed as a result of glacial action, are too shallow to support fish. Other lakes which support fish become quite shallow during late summer when the inflow is decreased with disappearing snow and lack of rainfall. Another desirable form of work in improvement of fishing conditions is planned with the return of the C.C.C. for another season and involves the addition of small rocks in the rock crevices of the outlets to these lakes to raise the depth of the lakes and to prevent the lowering of lake levels in the late summer and fall seasons.

The Medicine Bow Forest is traversed in part by the Lincoln highway, the Rocky Mountain highway and other main roads of southern Wyoming. Each year sees an increase in the use of the forest for fishing and other recreational uses with the result that fishing has gradually been getting less satisfactory each year. The construction of stream pools, fish ponds and rearing ponds affords an opportunity to increase greatly the fishing facilities, but in addition to these, have other very important considerations. These structures raise the water level which is important from the standpoint of supplies of water for irrigation and domestic consumption. They also serve efficiently in erosion protection and in some cases afford resting and nesting places for wild fowl, particularly ducks.

Huber C. Hilton,
Medicine Bow National Forest.

Field Office at Lincoln for Shelterbelt Project

With establishment of a central field office at Lincoln, Nebraska, planned for an early date, the Forest Service is rushing plans for the President's shelterbelt project in the Plains states. In addition to the general headquarters at Lincoln, it is expected that state divisional offices will be established in the capital cities of each of the states traversed by the belt—North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma and Texas.

Assistant Forester F. H. Morrell has been named administrative director. Active work will be started in the shelterbelt area as soon as the necessary organization is completed. Qualified man are being assigned to the project from the Forest Service rolls and are being hired from other sources to speed up the organization of the field work.

Raphael Zon, Director of the Lake States Forest Experiment Station, will be technical advisor on the determination of suitable species to plant in the various soil types, nursery selection and practice, planting practice, etc. The Bureau of Chemistry and Soils will assist in the study and classification of soils and the Bureau of Plant Industry will coöperate actively in technical service and in the use of its established nurseries and other facilities.

The American Forestry Series

Some years ago Professor Walter Mulford, Forest Economist on the Giannini Foundation at the University of California, made detailed plans for a carefully coördinated series of text and reference books, which should ultimately serve as a manual of American forestry.

Wherever possible, one volume is to carry forward at the point where another has stopped, enabling the student or reader to develop his knowledge in logical sequence. Arrangements for publication were made with the McGraw-Hill Book Company of New York and London, and the name American Forestry Series was chosen. Plans have been progressing steadily, with a number of authors at work on various contributions to the series.

The first volume to be fully completed is "Identification of the Commercial Timbers of the United States," by H. P. Brown and A. J. Panshin, New York State College of Forestry. The second volume is also off the press: "The Theory and Practice of Silviculture," by F. S. Baker, University of California. "Forest Mensuration" by Donald Bruce, Consulting Forest Engineer, Portland, Oregon, and F. X. Schumacher, U. S. Forest Service, Washington, D. C., is now going through the press and will be ready promptly. Among the other manuscripts in process of preparation are "Management of American Forests," D. M. Matthews, University of Michigan; "Forest Pathology," J. S. Boyce, Yale University; "Dendrology," William M. Harlow, New York State College of Forestry and E. S. Harrar, University of Washington; "Introduction to Forestry," Walter Mulford, University of California; and "Wood Technology," H. P. Brown and C. C. Forsaith, New York State College of Forestry.

Forest Protection by Radio

The Federal Radio Commission has granted Superior Pine Products Company, operators of Suwanee Forests with headquarters at Fargo, Georgia, a license for the use of radio to protect their forests from fire. A special emergency license authorizing operation on 2726 kilocycles was issued with the call letters W-N-E-E.

On the original license the power was limited to 50 watts, but several tests indicated that this power was insufficient to cover Suwanee Forest, the longest airline distance being approximately 32 miles. Consequently, a construction permit was issued to install a 100-watt transmitter which on a number of tests has proven adequate to handle the situation. The transmitter now in use is a Collins 100-watt and has given a satisfactory account of itself.

Rangers' cars, fire crews, and several C.C.C. trucks are equipped with receivers with fixed tuning. In other words, all that is necessary is to turn on the receiver, all tuning being eliminated by having the receiver tuned exactly to the proper frequency. The main transmitting station at Fargo transmits a short test call every hour. This is mainly to assure the receiving end that signals are coming through satisfactorily. The receivers in the cars are kept on continuously when the cars are in motion and, when stopped, the listening periods are of about two minutes duration in every fifteen.

Three lookout towers with observers on watch continuously during daylight hours report all smokes immediately to headquarters at Fargo, where the location is checked on a map by triangulation. If the fire is located on the Suwanee Forest or close enough to the boundary line to be dangerous, the nearest fire crew and ranger are called, given the location, and told to proceed to it at once.

At various points in the forest there are landline telephones, and on coming near one of these phones the crew reports to headquarters to indicate that it is on its way to the fire and to receive further instructions. After the crew arrives at the fire it keeps in constant touch with

the radio, since the lookout towers can detect almost immediately any fresh breakout of the fire. This information, which may be the means of preventing lost time and lost effort, can be immediately passed on to the crew fighting the fire.

Radio may be a means of catching up with and apprehending persons maliciously stringing fire through the woods. The observers will be enabled to tell almost the exact course of the incendiary by watching the various points from which smoke arises. Given this information, the ranger in many cases will be in position to apprehend the person doing the firing.

At the present time only one way communication is provided, but it is hoped that in the near future a system may be worked out whereby it will be possible for the fire crew to acknowledge receipt of a message, if not by voice at least by signal.

Considering that during even the poorest radio conditions, communication was maintained between headquarters and a moving car 30 miles away, I believe that radio will be a great asset in forest protection and the means of saving many acres from destruction by fire.

W. M. Oettmeier,
Superior Pine Products Company.

McArdle Named Dean at Idaho Forest School

Dr. Richard E. McArdle, formerly chief of the section of silviculture at the Pacific Northwest Forest Experiment Station, Portland, Oregon, has been named dean of the school of forestry at the University of Idaho according to an announcement by President M. G. Neale of the university. McArdle will succeed Dr. Francis Garner Miller, who died last spring.

Dr. McArdle received his forestry training at the University of Michigan, graduating in 1923. After several years with the U. S. Forest Service as a specialist in forest mensuration, he returned to the university for graduate work and was granted his doctor's degree in 1930. Since that time he has been at the Portland forest experiment station in charge of forest fire research and as head of the section of forest management.

The new dean was born in Lexington, Kentucky, saw service in the army during the world war and has traveled extensively in the forest regions of this country. He is the author of numerous technical articles and reports on forestry subjects.

REVIEWS

Termites and Termite Control. Edited by Charles A. Kofoid. *University of California Press, Berkeley, California. 768 pp., 182 figs. 1934. Price $5.00.*

Termites and termite control is an outstanding book for several reasons. In the first place it is outstanding because of its exhaustive treatment of the subject, in the second place it is outstanding because of the long list of distinguished scientists, who have contributed chapters dealing with their respective fields of specialization, and in the third place it is outstanding because it clearly shows the efficacy of coöperative research.

Even though the reviewer were unrestricted in the length of his review, it would be quite impossible for him, or any other single individual, to properly evaluate the content of each of the 56 chapters of the book. Each of these chapters has been prepared by a specialist, and although there may be certain statements in some or all of these chapters with which the individual reader may not agree, by and large the book is by far the most exhaustive, comprehensive, and authoritive treatment of the termite problem in the English or in any other language.

Nothing that the reviewer might say concerning the book would give as correct an impression of its scope as a list of the chapter titles. For this reason, the inclusion in this review of the chapter headings appears to be fully justified despite the length of the list.

PART I. TERMITES AND THEIR BIOLOGY

1. Biological backgrounds of the termite problem.
2. Climatic factors affecting the local occurrence of termites and their geographical distribution.
3. The constitution and development of the termite colony.
4. Some factors limiting the distribution of termites.
5. The external anatomy of termites.
6. The internal anatomy of termites and the histology of the digestive tract.
7. Protozoa in termites.
8. Hydrogen-ion concentration in the termite intestine.
9. The association of termites and fungi.
10. A world view of termites.
11. The termite fauna of North America with special reference to the United States.
12. Habitat and habit types of termites and their economic significance.
13. American subterranean termites, their classification and distribution.
14. The biology and economic significance of the western subterranean termite, *Reticulitermes hesperus*.
15. The barren-lands subterranean termite, *Reticulitermes tibialis*.
16. American subterranean termites other than those of the Pacific Coast.
17. The desert subterranean termite, *Heterotermes aureus*.
18. The desert termite of the genus *Amitermes*.
19. Dry-wood termites, their classification and distribution.
20. The distribution and biology of the common dry-wood termite, *Kalotermes minor*.
    I. Distribution and means of indentification.

Thirty-four different authors contributed chapters, or sections of chapters, to the book. Despite the reviewer's desire to enumerate all of the authors, lack of space prevents him from so doing. A few of the authors, however, should be mentioned. Outstanding contributions to the study were made by Dr. F. F. Light, Professor of Zoology, University of California; Dr. Thomas E. Snyder, Senior Entomologist, Bureau of Entomology, U. S. Department of Agriculture; Dr. Charles Kofoid, Professor of Zoology, University of California; Dr. Merle Randall, Professor of Chemistry, University of California; and Mr. A. C. Horner, Manager Western Office of National Lumber Manufacturers Association. The complete list of authors and their respective fields of specialization not only indicates the manifold implications of the termite problem, but at the same time augurs well for the comprehensive attack made on the problem.

"Termites and Termite Control" is of outstanding importance to any one interested directly or indirectly in research. The organization of the Termite Investigation Committee might well serve as a model for the attack of any important problem. Certain sections of California were confronted with a problem—termites. What is the termite problem and how can it be solved? The Termite Investigations Committee marshalled the best talent in the field from the University of California, the U. S. Department of Agriculture, and elsewhere and the problem was studied from various points of view. "Termites and Termite Control" is the answer.

There is much of interest to the forester in the book. After all it is largely the products of the forest which are destroyed by termites. Parts II and III of the book especially deal largely with destruction of wood and wood construction by termites and effective control measures against them.

"Termites and Termite Control" will be of great value not only to foresters but also to biologists, entomologists, engineers, teachers, and many other groups. In this one volume will be found much, if not most, of all the knowledge dealing with termites. The Termite Control Committee of the University of California Press is to be congratulated for the preparation and publication of this splendid work.

HENRY SCHMITZ.

The Profession of Forestry. By Arthur D. Reed, *The MacMillan Company, New York. $1.25.*

According to the author, this little book "is written primarily as an aid or guide to young men casting about in search of a vocation." The book not only accomplishes this purpose but goes further. It may well be read by the general public whose ideas of forestry have been gleaned from watching men dig neat ditches around trees in a city park.

The Profession of Forestry defines all branches of forestry, lists the qualities necessary to a forester, and tells how, when and where these qualities may be developed, approximately how much it will cost, and the intellectual, spiritual and monetary return that may be expected after said development takes place. This exposition is particularly to be commended, since most high school youths have not the faintest idea of what they are getting into when they decide to take up forestry in college. For this reason, every elementary school library should have a copy of this concise work.

The volume is attractively gotten up and well illustrated with photographs

from the U. S. Forest Service, Texas Forest Service, and other sources.

C. B. SCHLOTZHAUER,
Society of American Foresters.

Notes on German Game Management, Chiefly in Bavaria and Baden. By Ward Shepard. *Senate Committee on Wild Life Resources, 1934.*

Of the several documents so far appearing under the aegis of the Senate Committee, this is the briefest and most valuable. It is a digest of field observations made by the author for the Biological Survey and the Carl Schurz Foundation, incidental to his study of German forestry. It deals entirely with forest game, but creates, at least in my mind, a pressing desire for an equally pithy analysis of farm game. With such a companion study before us, we should have a rounded picture of this thing called game management, which is done all over Germany, and talked about all over America, as a matter of ancestral habit.

On state forests the hunting is done by forest officers, hence the economic return from game crops comes only from the sale of meat, and is less than one per cent of all forest revenues. On communal and private lands, however, both the hunting and the meat are sold. Small holdings, in order to hunt, must pool their game and *entrust its management to the commune*. It is only on large private estates that the owner shoots and manages his own game, subject to state seasons but not kill limits.

In its net trend this system contravenes the usual assumption that "game in Germany is private property." It seems to be very much public property, but is managed for public revenue rather than for public recreation. On small holdings, at least, the public asserts its ownership almost to the exclusion of the private landowner. I see little for us to copy in German game economics except the compulsory pooling of management on small acreages, and the delegation of responsibility for details, subject to state inspection, on large ones. Our present "farm coöperatives" and "shooting preserve laws" seem to be taking us in this general direction.

In the biology of game cropping, however, the Germans offer us many a pointer, the most striking of which is their experience with sex ratios in deer. Under a buck-doe ratio of 1:6, the roe deer in the Black Forest deteriorated in both weight and antlers, but under a revised ratio of 1:1.5, supplemented by deliberate culling of inferior individuals, weights have increased 20 per cent and antlers have improved. Most American deer herds are drifting toward low buck ratios. We "cull" the best, rather than the worst. Would it not be a wise precaution to measure the result? Yet no state, except perhaps Michigan, is doing so. Of our several attempts to "study" deer, only one or two have even attempted to formulate a normal sex and age composition for deer herds.

The deer food situation, in relation to population density and forest damage, throws a flood of light on our current problems. The pure-conifer silviculture prevailing in Germany for a century has made artificial winter-feeding a universal necessity. Hardwood plantings, whether for timber or for deer-browse, must be fenced to survive, even under moderate deer densities. Likewise clover meadows planted for deer must be fenced and can be opened only at intervals. Stripping of sprucebark by deer is a widespread trouble ascribed to unbalanced nutrition. Felled conifers of all species are promptly stripped by deer. On the Kaibab or in Jackson's Hole we would call these symptoms of radical overstocking, but the moderate densities of the German herds indicate that they are merely symptoms

of unecologic forestry,—of single-track silviculture. The present strong trend toward mixed stands will eventually relieve this situation, but has not yet done so. We have here simply one more instance of the crying need for naturalism in conservation,—one more proof that the forester with a single eye for sawlogs, or the game manager with a single eye for fur or feathers, is an anachronism. In the long run we shall learn that there is no such thing as forestry, no such thing as game management. The only reality is an intelligent respect for, and adjustment to, the inherent tendency of land to produce life.

German predator policy, as described by Shepard, is refreshingly naturalistic. Martens, otters, and eagles, long since extinct in all but our "backwoods" states, are not only suffered to exist, but are managed like the deer. Foxes, despite their depredations, are cropped in proper density for fur. A vigilant bird-lover group insists on the rational protection of raptors, and the sportsmen, either out of intelligence or necessity, acquiesce. The culling function of predators seems to be universally recognized as a biotic necessity. Will this happy day come to America before, or after, our magnificent predators are gone?

German game yields, as sketched by Shepard, are higher in private and communal districts than in state forests. This reflects the fact, so hard for American conservationists to learn, that high altitudes and poor soils yield light crops, whether of corn, deer, or sawlogs. (Those who habitually relegate wild life to land good for nothing else should, but will not, ponder this lesson.) The private and communal districts of Bavaria yield one mammal per 36 acres and one bird per 62 acres per year, whereas the Bavarian state forests yield only one mammal per 100 acres, and one bird per 400 acres. The highest aggregate kill, as compared with our forest states, arises not from high density, but from the absence of blank areas, and from the high kill-ratio per unit of population. That is to say, Bavaria gets a game crop because all the land is working and all the breeding stock is productive.

Of great import to us is the evident fact that German game biology is empirical, not scientific. Game managers receive only routine training as foresters. An effective and vital system of conservation has been built, not upon a foundation of research, but upon a foundation of experience. That system is of necessity encrusted with the political and economic barnacles of feudalism, but it delivers results, despite the handicap of a man:land ratio vastly less favorable than ours. Is it a rosy dream to envisage the ultimate emergence of an American system, founded upon ecological science, unencumbered by too much history, utilizing to the utmost our basic advantage of elbow-room, and so integrated with our sociology and economics as to perpetuate indefinitely the opportunity for contact with natural beauty? It seems to me not a dream, but a challenge.

Aldo Leopold,
University of Wisconsin.

Youth Rebuilds—Stories From the CCC. Preface by Ovid Butler. *Published by the American Forestry Association, Washington, D. C. 190 pp., 25 photographic illustrations. $2.00.*

This is a collection of human interest stories of what the Civilian Conservation Corps has meant to the 38 members of the Corps who are the authors. The book is the result of a prize-story contest conducted by *American Forests* magazine in 1933 in which there were over 2,000 entries. A total of 31 stories and 7 poems are included. There is a preface by Ovid

Butler, who collected and edited the volume. The book is dedicated to President Franklin D. Roosevelt and has for a foreward an extract from his radio address of July 17, 1933, to the members of the Civilian Conservation Corps. The appendix includes statistics on the work accomplished during the first year of the CCC and the text of the Emergency Conservation Act of March 31, 1933. It is an attractive volume.

During the past year American newspapers and magazines have carried many news items and stories of the CCC, the great experiment in the rehabilitation of American youth. These items have dealt for the most part with the camps, the work being done, or incidents and accidents in the lives of the youthful members of the CCC; these have been written by and from the point of view of adult outsiders. Little or nothing has appeared in print as to what the CCC has meant to the boys themselves, what effect this great adventure has had on the bodies and minds and souls of some 300,000 American youths. Here at last is that story told by 38 of these young men. The Editor has wisely done little or no editing but presents the human documents as they came to him from camps all over the United States. The stories are from the soul. Some are excellent pieces of writing, some in halting English, but each telling an intensely human story.

Outside of the statistics in the appendix, there is little in the stories themselves of material facts of what or where or how the work was done. The authors of these stories have set down in simple and direct style the intimate and personal details of their daily struggle for work, or an existence, before the CCC came into their lives; their reactions when they first joined up; their first impressions of the camps, their fellow members, the Army officers and the civilian supervisory personnel in charge; and the physical, mental and spiritual changes that took place as they became welded into an effective and efficient body of men working well and cheerfully day after day in the cause of American conservation. There is utter sincerity, a splendid courage, an appreciation of a worthwhile work, a strong grip on self-pride, a new outlook on life and its verities, a healthy comradeship, a refreshing cheerfulness, running all through these stories. Youth is being rebuilt, largely through its own efforts, in these CCC camps.

During this first year of the CCC movement too often the foresters have been interested largely in the work that these boys could do, the miles of truck trails and phone lines built, the number of dead snags felled or bridges built, or gullies filled. Too often have the civilian agencies overlooked the fact that these were not ordinary construction camps, nor the boys ordinary day laborers. The camps were CCC camps, and the boys were there to enable them to get a new grip on themselves, to rebuild human bodies and spirits,—just as much as to build roads and trails and lookout towers.

Here in *Youth Rebuilds* is something infinitely more interesting and more valuable than material statistics; here are human facts on the building up of weak, wasting and undernourished bodies, the rebuilding of human pride and courage and self-respect, a regrasp on the spiritual values of life.

Here is a chance for the foresters to learn something of the other side of the CCC, as told by the boys themselves. This book should be read largely also by the general public, to give it a new slant on what the Civilian Conservation Corps really means to American youth.

John D. Guthrie.
U. S. Forest Service.

SOCIETY AFFAIRS

In this issue of our magazine the Society Affairs Section is devoted entirely to a consideration of the JOURNAL OF FORESTRY's editorial policy. It centers around the petition to the Council of June 13, 1934, whose signers are plainly dissatisfied with present policies and methods of management, and demand, it would seem, a radical change.

In the following pages you will find: first, an introductory statement by President Chapman, including a digest of the reactions to the petition on the part of the Council, and on the part of those 87 members of the Society who have had opportunity up to date to write the Council; second, the petition itself; third, a statement by the former Editor-in-Chief, Professor Emanuel Fritz; fourth, a statement by the Executive Secretary giving a historical account of the editorial policies from the beginning and an exposition of current policies and practices; fifth, the Society's "Principles of Forest Policy" which were adopted by referendum vote and have been in effect since the spring of 1931.

This symposium, together with President Chapman's editorial, will it is hoped give you an intelligible picture of the situation so that you can make up your minds concerning it and advise the Council accordingly.—FRANKLIN REED, *Editor-in-Chief.*

STATEMENT BY PRESIDENT CHAPMAN

On assuming office in January, 1934, I found that the arrangement in force by which the Executive Secretary acted as editor-in-chief of the JOURNAL was to continue through the May issue, at which time the Council could make further disposition of the matter.

No meeting of the Council is possible during the year without prohibitive expense, consequently the consideration and decision on the future management of the JOURNAL would either have to be conducted by correspondence or await the annual meeting in January, 1935.

After my return from the West I took up this matter and wrote the following letter to the Council:

"The existing arrangement regarding the editorship of the JOURNAL by which the Executive Secretary, Franklin Reed, was made editor has expired. This was run through the May issue. Action should be taken at once on the editorship beginning next fall with the October issue.

"In talking with Prof. S. T. Dana, former editor, it was his opinion that ultimately the editorship would best be divorced from that of Executive Secretary, but in considering possibilities for the job he conceded the fact that it would be next to impossible to find a man at this time who could devote the time to it without compensation. This was based upon his own experience. He suggested that the ideal arrangement would be someone who had retired from active service but retained his youthful vigor. He did not have any one to fill this category to propose for the job.

"I believe that the Society is safe in continuing or extending the present arrangement by which Mr. Reed acts as editor *until the matter can be thoroughly thought out.* I shall be able to exercise a fair degree of supervision over the editorial policy, at least for the current year. At the end of that time if it appears that a change should be made we will be in a better position to know what to do. I believe that Reed has done a very creditable job on the whole. I, therefore, recommend that Mr. Reed's appointment as editor be continued throughout the present fiscal year and until further action by

the Council, which would not be before the annual meeting in January, 1935.

"I ask you to record your tentative vote as follows: Shall the Executive Secretary be continued as editor until January 1, 1935, and thereafter, until this arrangement is confirmed or changed by the Council at its annual meeting?"

In reply to the above letter ten members of the Council voted to continue Mr. Reed as editor-in-chief until the annual meeting and to decide on the future policy for the editorship at that time. The eleventh Mr. Clapp, was one of the signers of the petition and indicated this action as his recommendation on the question as follows: "See recent statement on editorial policy, etc., which I signed along with several other members of the Society. E. H. C."

At this time nothing was known of the petition dated June 13th which first reached the Council from Mr. Zon under mailing date of June 28. On receipt of the petition, request was made by me that the Council comment thereon. Replies were received from nine of the ten members, Mr. Clapp not replying. The President is the eleventh.

The Council in their replies considered the three "steps" suggested by the petitioners. Of the second, or specifications for the editorship, the ground was covered by S. N. Spring who wrote: "The qualifications for editor as stated are simply ideal expressions, generally considered in picking an editor for any professional Journal."

As to the first "step," or advisability of the separation of the office of editor-in-chief from that of executive secretary, the Council's opinion was unanimous that there was *no objection* to such a change of organization, that it probably constituted the goal toward which to work, and that they were in agreement with the petitioners as to its ultimate desirability. The Council were likewise unanimous in calling attention to the fact that the present arrangement had been dictated by the demonstrated inability of previous editors to continue to devote the required amount of time, without compensation, to the editorship, and the lack of funds wherewith to employ an editor in addition to the Executive Secretary, hence to the practical necessity of the present arrangement until larger Society revenue was forthcoming.

The third step suggested was "to insure the independence of the editor from any pressure on the part of the administration that may be in office; he should not be subject to dictation by the Executive Council with respect to editorial policy."

It is a very salutary incident that this point was raised, for the issue of editorial independence has never been crystallized and now bids fair to be. On this question five of the ten members took the position that the Council, elected as the policy making body, was responsible for the editor and for his editorial policies, just as they were responsible for his appointment, and that it was extremely unwise to constitute the editor as a czar, with no controlling body to stand between him and the Society. With this position the President agrees.

Of the five remaining members (Mr. Clapp not replying) two did not discuss this point and the remaining two favored a strong and independent editor, while not specifically repudiating the directive functions of the Council.

On July 24 after receiving these replies, the President sent the following letter to the signers of the petition:

"Some two weeks before receiving the recent petition signed by you, and without knowledge of its existence, I had asked the Council to renew the arrangement with Mr. Reed as Editor until the meeting of the Council in January, at which time we could decide on the future arrangement regarding editorship of the

JOURNAL. The Council have by ballot confirmed this temporary arrangement.

"As six months is none too long a time to consider thoroughly the question of suitable candidates for editorship, and as we accept your petition as a sincere effort to coöperate for the advancement of the Society, may I, for the Council, formally request that you give us the benefit of your advice as to candidates who fill the specifications set forth in your petition.

"I would request that you give us the names of twelve men, numbering them in order of your preference, and to do this promptly in order that we may make progress in this matter."

Replies have been received from signers Marshall, Zon, Bates, Sparhawk and Kneipp.

Mr. Marshall submitted a list of twelve candidates; Bates and Kneipp one each; Sparhawk stated he had no one in mind; Zon expressed the opinion that it was not necessary to employ a man on a salary for editorship as many scientific societies secured editors from scientists who were glad of an opportunity to give their services for such a task. Three of the petitioners also wrote letters amplifying their reasons for signing it.

In order to determine in a preliminary way what the sentiment of other members of the Society was towards the subjects discussed in the petition, copies of the document were sent to all section chairmen and secretaries, all state foresters, all heads of forest schools, the editorial staff, secretaries of forestry associations, regional and assistant foresters in the U. S. Forest Service, and about fifty other members of the Society. The letter follows:

"At the request of President Chapman, I am enclosing for your comment and recommendations copy of a petition, dated June 13, 1934, to the Council of the Society, and signed by twelve Society members who plainly disapproved of the manner in which the JOURNAL OF FORESTRY is now being handled and who advocate, it would seem, a radical change in editorial policy and in management.

"The JOURNAL is the property of the Society as a whole, and of all its members. Its editorial policies and its methods of management therefore should be such as to meet with the approval of the largest possible majority. It is not the personal property of the Editor-in-Chief, to be run according to his own individual whims and fancies, nor should its policies be dictated by any one small minority group or faction. Whether the views expressed in this petition are the views of the majority of the membership, or whether they are simply the opinion of a small minority, or whether this group is wholly, or in part, right or wrong, the Council can determine best with the advice and assistance of as large as practicable a number of representative members like yourself.

"Will you be so good as to give the Council the benefit of your opinion in this matter at your earliest possible convenience? Your reply will be forwarded immediately to President Chapman for him to take up with the rest of the Council. Franklin Reed."

To this letter 87 replies were received by August 23, distributed as follows:

Officers of sections including chairmen and secretaries—21.

Members of editorial staff—4.
State foresters—13.
Heads of forest schools—12.
Secretaries of forestry associations—7.
Members of government services—14.
Private individuals—16.

Since the letter was not in the form of a ballot or questionnaire, the replies covered a wide range of opinions, and are of great assistance to the Council as a preliminary cross section of opinion in the Society.

The President has endeavored to tabulate all opinions expressed on definite points with the following results: The number of opinions under any one point falls short of the total, since many correspondents touched only one or two questions. The tabulation, of course, did not include the twelve signers of the petition but only those who replied to the circular.

1. Shall the office of editor be separated from that of Executive Secretary? Eight voted no unequivocally, and 33 approved of the separation, but with hardly a single exception conditioned this change on the *financial ability of the Society to compensate the editor.* One was farseeing enough to suggest the need of increasing the dues for this purpose. The others preferred apparently to carry out the separation only when it could be afforded on the present basis.

2. Shall the editor be absolutely independent of the Council? Thirteen favored this plan. Thirty were opposed to it, some emphatically, on the basis that the Council was chosen to represent the Society and could not be deprived of this responsibility of supervision over editorial policy without disrupting the Society.

3. Does the conduct of the JOURNAL under Executive Secretary Reed as editor meet with approval? Forty-five members expressed commendation and satisfaction with the improved character of the JOURNAL; and only four replies were received which expressed disapproval or condemnation.

4. Should the Society and JOURNAL adopt a more vigorous editorial policy with respect to economic questions? Twenty-seven answered yes. Six were against such a course.

5. Should the idea of a separate publication, conducted for the purpose of advancing progressive economic principles, be approved? Three of the correspondents sensed a real benefit in such an independent publication. (One called attention to the American Forestry Association's field as covering this line.) Seven advised that the proponents of the new publication by all means be permitted to carry out their proposal rather than commit the Society to championship of untried economic theories. Thirteen regarded the suggestion as distinctly injurious to professional progress, disruptive of cooperative spirit and inadvisable, while four severely criticised the suggestion as a deliberate threat to force the Society to capitulate.

6. Was the petition clear as to its basis for criticism and objectives? Thirty of the correspondents raised serious objections to the statements in the petition which criticised the past editorial policy without giving any specific facts or examples. They did not accept as justified the expressed desire of the signers to avoid personalities and nine specifically asked for a frank and open discussion. Some even sensed personal hostility. This clause seemed to have aroused more suspicion than it allayed (See Table 1).

The President wishes to say that the presenting of this petition is an action sure to result in far-reaching benefit to the Society. In his own case, he sought for many years to accomplish the same general type of objectives as are contemplated by the signers, but preferred to work through an organization definitely intended for propaganda, namely, the American Forestry Association. He found however, that in the absence of control by men educated and trained as foresters this organization was constantly skidding onto a sand bank for lack of courage and incentive to fight the battles of the public. With the advent of a professional forester or secretary this handicap has been greatly modified, but still exists in the Board. Meanwhile the Society of American Foresters was developing healthily and naturally as a professional

organization with a professional JOURNAL.

The issue on which the last election was fought was distinctly professional in character and in true keeping with the normal evolution of the Society. It was not, as is being erroneously stated, an effort to align the Society in opposition to the Forest Service, but rather, to place it in a position of vastly greater strength as a supporter of such sound Forest Service and other public policies as receive the approval of professional foresters. It continued the independence of the JOURNAL as a medium for discussion of all phases of thought, without diminishing its possibilities as a constructive agency in all sound progress in forestry. It upheld the principle that public foresters who courageously imperilled their jobs for the sake of professional standards should be vigorously supported by the Society, and that those *who betrayed these standards should be as vigorously condemned*, and did not substitute, as has been claimed, an indiscriminate trade union platform of backing Society members, right or wrong.

It is sincerely to be hoped that the members of the Society can realize, through the JOURNAL, the full measure of strength and benefit which should flow from a strong, mature, professional organization, capable of both leadership and criticism, preserving zealously the crowning glory and most priceless possession of civilization, the right of free speech and fearless criticism. In this way only can foresters and forestry survive the remorseless test of practical application, the revealing force of time and experience. Let us build soundly, as a profession, avoiding hysteria, seeking the facts. To this objective the Society and the JOURNAL are dedicated.

H. H. CHAPMAN,
President.

THE PETITION OF JUNE 13, 1934

The Executive Council,
Society of American Foresters,
839 Seventeenth Street N. W.,
Washington, D. C.

Friends:

A group of members of the Society (whose names appear below) have come to the conclusion that the editorial policy of the JOURNAL during the last few years no longer represents the broad social ideals of the founders of the Society.

At a time when vast, surging forces

TABLE 1

THE OPINIONS TABULATED ARE DISTRIBUTED BY CLASSES ACCORDING TO THE TABULATION SHOWN BELOW. THE NUMBERS CORRESPOND WITH THOSE USED IN THE SUMMARY

	1		2		3		4		5			6		Number repre-sented
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Let 'em	No	Yes[1]	No	
Officers of Sections	8	1	1	9	12	1	6	0	1	1	5	0	5	21
Editorial staff	2	0	1	1	1	0	0	1	1	0	0	0	2	4
State foresters	5	1	5	1	4	1	6	0	0	0	1	0	5	13
Heads of schools	7	1	4	3	4	0	7	1	0	0	6	0	2	12
Secretaries of associ'ns	1	3	0	3	5	0	1	0	0	0	2	1	3	7
Government services	8	2	2	8	8	2	5	1	0	0	1	1	2	14
Private employ	2	0	0	5	11	0	2	3	1	6	2	0	13	16
Totals	33	8	13	30	45	4	27	6	3	7	17	2	32	87

[1] Expresses unqualified approval. Partial approval is expressed under the other columns.

are overwhelming the accepted truisms of the past, the JOURNAL is lost in petty quibbling over inconsequential matters and artificially created issues.

The vital problems of forestry are overlooked or discussed not from a social standpoint or in the spirit of the New Deal.

The membership of the Society has recently been enriched by a large number of young men who are earnestly seeking positive leadership which keeps in step with the dynamic movements of the present. This they do not find in the JOURNAL.

In the field of technical forestry, the JOURNAL provides a satisfactory outlet for some of the scientific findings of the profession. In the field of forest policy, however, it lacks the spirit of social leadership which was once a distinguishing characteristic of the profession.

The future of the Society—and the JOURNAL as the mirror of the profession—is close to our hearts. We would be guilty of indifference if we failed to point out the weaknesses of our present position and seek remedies.

One of the proposals which has been crystallizing, is the publication of an independent organ to fill the gap left by the recent purposeless editorial policy of the JOURNAL. Funds have been made available to publish such an organ.

We are not unmindful, however, of the possible effect of such publication upon the official organ of the Society and upon harmony within the Society itself.

We still have implicit faith in the idealism of the rank and file of our Society and before adopting this extreme measure we should like to make an appeal to you, the members of the Executive Council, to view the situation with us dispassionately and realistically, in an effort to make the JOURNAL the real spiritual spokesman of the profession.

Among the first steps in this direction we suggest:

1. The separation of the offices of the Executive Secretary and Editor-in-Chief;

2. Appointment as Editor of the JOURNAL, a man of high standing in the profession and of scholarly attainments and literary ability—a man with strong social convictions but tolerant of the opinions of others, scrupulously honest intellectually, and a strong believer in complete freedom of expression;

3. To insure the independence of the Editor from any pressure on the part of the Administration that may be in office, he should not be subject to dictation by the Executive Council with respect to editorial policy.

We should prefer, in this letter, not to go into specific instances where the editorial policy of the JOURNAL has been prejudicial to the best interests of the Society. This would only lead to long-drawn-out argument and possibly to personal recrimination, which we wish to avoid.

It is sufficient that dissatisfaction with the policy is prevalent among many members of the Society, and we must face it frankly.

If the Executive Council is not convinced of the need for the changes suggested by this group, we would like to propose that this letter be published prominently in the next issue of the JOURNAL and all members of the Society be invited to express their views on the matter.

The final decision can then be made after full and open discussion, for which adequate provision should be made at the next annual meeting.

Signed:

George Ahern
1760 Euclid St., N. W.
Washington, D. C.

Carlos G. Bates
2370 Chilcombe Avenue
Saint Paul, Minnesota

Earle H. Clapp
Branch of Research
U. S. Forest Service
Washington, D. C.

L. F. Kneipp
Branch of Lands
U. S. Forest Service
Washington, D. C.

W. C. Lowdermilk
Bureau of Soil Erosion Control
U. S. Department of Interior
Washington, D. C.

Robert Marshall, Forester
U. S. Indian Service
Washington, D. C.

E. N. Munns
U. S. Forest Service
Washington, D. C.

Gifford Pinchot
State Capitol
Harrisburg, Pennsylvania

Edward C. M. Richards
Tennessee Valley Authority
Knoxville, Tennessee

F. A. Silcox
U. S. Forest Service
Washington, D. C.

Wm. N. Sparhawk
U. S. Forest Service
Washington, D. C.

Raphael Zon
2237 Doswell Avenue
Saint Paul, Minnesota

Statement by Former Editor-in-Chief Emanuel Fritz

Inasmuch as the Zon petition regarding the Journal of Forestry is to be published I beg leave to make a public reply, but more as a former Editor than as a Council member. I think that eight years as an associate editor and three as Editor-in-Chief qualify me to speak authoritatively on the problems of the Journal.

That the Journal falls short of what it should be and can be must be admitted. Nevertheless the present Journal is infinitely superior to the Journal of 1928 et ante in every respect, not excepting adherence to the ideals of the founders of the Society unless a more realistic approach can be called an impairment. I will take up the principal reasons for its shortcomings later.

Neither can we take exception to the qualifications set up by the petitioners for the editorship. They are obvious and well understood and it was as unnecessary to state them as it would be to say the director of an experiment station should be first of all "tolerant of the opinions of others, scrupulously honest intellectually." The Council has always sought an Editor who possessed the highest score in the necessary qualifications, though it has been seriously handicapped by its limited funds.

The Journal's problems were brought to the attention of the Council and members in each of my three annual reports and in a 9-page unpublished supplementary report of 1932 entitled "The Future of the Journal of Forestry." These re-

ports[1] answer all the legitimate points brought up by the petitioners and now make interesting reading in the light of the petition. The policies there set forth, I believe, are being continued by the president Editor to the best of his ability.

What ails the JOURNAL is not the fault of the Editor so much as that of the profession. The members, with some laudable exceptions, have never given the JOURNAL or its Editor proper or adequate support. Some have embarrassed the magazine and thereby robbed it of a chance to grow in quality and prestige by giving to other publications articles which should have been offered to the JOURNAL. Some have spread the unfounded rumor that "Policy articles" are not desired, and others have ignored the Editor's invitations to contribute. And now a group of twelve wishes to further weaken the Society's official organ by publishing a rival magazine! It is hard to see how the new magazine can survive if it gets no more contributions from its sponsors than they gave their JOURNAL OF FORESTRY.

I must condemn the charge that space has been given to "petty quibbling" as a showy misstatement. I would like to be shown an example in the last six volumes.

If some vital problems are not covered it does not follow that the Editor overlooked them. It is more likely due to his inability to get competent men to discuss and write upon them. If the competent members considered their JOURNAL not good enough for their discussions I fail to recall that they voiced their New Deal sentiments in other magazines. What they don't write can't be published. For the period of my own editorship I can exhibit a sizable file of solicitations and reminders addressed to members who should have been glad to contribute. The response was pitifully weak. A list would interest the petitioners. Doubtless the present Editor has had the same experience.

The main complaint seems to be an insufficient number of "policy" articles, and that in the past they have been discouraged. Policy articles have not been blacklisted and never should be. The inclusion of a reasonable number of well written, well thought out policy articles is highly desirable. They would stimulate our idealistic sides. But they should be real contributions and not sophomoric rehashes of material oft printed before or destructive criticisms that affront the reader's intelligence. Nevertheless, with nothing better available such policy articles have had to be printed. If one should boil down most of our past policy articles the result would be the simple statement that forestry is a necessary thing. I think we long ago proved that forestry is necessary. Then why restate it? Why not devote our space now to show how forestry can be accomplished in the woods? The implication that our past articles were not high in quality is well founded. But if they who can write better policy articles don't write them, the Editor can't be expected to pull them out of thin air. The scientific, technical and spiritual tone of the JOURNAL can not be raised if the members don't give it a higher grade of material to print.

The petitioners forget that the forestry profession has many divisions, and that there are silviculturists, mensurationists, protectionists, utilizationists, economists, recreationists, idealists, etc. All look to the JOURNAL for additions to their field of knowledge or interest. I maintain that

[1] JOURNAL OF FORESTRY, Vol. 29, p. 294; Vol.30, p. 367; Vol. 31, p. 233. See also "A Chat with the Editor," Vol. 28, p. 1014.

these fields have equal rights for space. The JOURNAL is not solely a professional magazine in which members can propound their views on the social aspects of forestry. It is equally a technical publication from which that forgotten forester, the practitioner, hopes to get the technical help he needs to effectuate what the founders of the Society preached.

Policy articles certainly should not outnumber those on silviculture, protection, etc., combined. A little tolerance here and respect for the other readers who want meat and not menus, will make for the balanced JOURNAL we should have and which I am sure has been the aim of the present Editor, and certainly was the aim of his immediate predecessors.

The JOURNAL is indeed the "mirror of the profession," but like a mirror, it can reflect only that which is placed before it. If the membership doesn't or isn't competent to submit better papers, the JOURNAL will show the effects. So far, the JOURNAL has reflected a truthful picture of the state of the forestry profession, not only by what it *has* published but also by what it *has not* published. The present controversy is a good example, and personally I regret to see space so used. But the petitioners have requested that their petition "be published prominently."

The petitioners make it appear that there have been numerous "instances where the editorial policy of the JOURNAL has been prejudicial to the best interests of the Society." I think, if the President, would insist that they furnish him with a list of such instances, we members of the Council and the present Editor could learn just what or who they are shooting at.

The petitioners evidently were not aware that the Council had already considered and acted upon the separation of the offices of Executive Secretary and Editor-in-Chief. For the present I can see no chance of getting a man who is able to contribute gratis 100 hours per month, furnish his own clerical help, and be willing to accept carping criticism instead of gratitude. I am on record as favoring a separation of the offices. I neither defend nor condemn the present Editor. We must be charitable in our criticism of a man who is carrying a double load and is trying to serve two masters.

The man does not live who can edit the JOURNAL OF FORESTRY or any other magazine and satisfy all his readers. An editor is expected to be "tolerant of the opinions of others," to be a "strong believer in complete freedom of expression" and to be "independent." Yet, if he exercises these qualities and permits a contributor to present a view in opposition to that of a certain group he is condemned as having prostituted the "ideals of the founders of the Society." We want both sides of every question, not volumes on one. As to independence, any editor who attempts to exercise it when this powerful group is on the other side, simply invites trouble. I know, because I ran into it and I don't think I lack independence.

At a time when forestry has been handed its sweetest victory on a diamond-studded gold platter one group wants to indulge in debate while the rest are straining to practise forestry in the woods. Are we going to let the first group control the JOURNAL for its debates or are we going to insist that our official organ provide a proper assortment and an adequate number of technical tools?

EMANUEL FRITZ,
Former Editor, Journal of Forestry.

AN EDITORIAL POLICY FOR THE JOURNAL OF FORESTRY

The petition of June 13, to the Council concerning the JOURNAL OF FORESTRY should stimulate among the other mem-

bers of the Society an active interchange of ideas about their magazine, whether and wherein it is good or bad, and how it might be made better. The outcome should be a clear cut and commonly acceptable editorial policy for the future guidance of the Editorial Staff. Toward that end it is perhaps best to begin with an appraisal of the JOURNAL itself, as it has been under previous editors-in-chief, and as it now is under the present incumbent in that distinguished office.

The petition alleges that, "the editorial policy of the JOURNAL no longer represents the broad social ideals of the founders of the Society." The founders were Gifford Pinchot, Overton W. Price, William L. Hall, Ralph S. Hosmer, Thomas H. Sherrard, E. T. Allen and Henry S. Graves. Their first meeting was on November 30, 1900. Their first Constitution stated the objectives of the Society to be—

"The object of this Society shall be to further the cause of forestry in America by fostering a spirit of comradship among foresters; by creating opportunities for a free interchange of views upon forestry and allied subjects; and by disseminating a knowledge of the purpose and achievements of forestry."

To further these ends, the Society, in May 1905, began the publication of the "Proceeding of the Society of American Foresters" which was continued until 1917. Beginning with the address of Theodore Roosevelt, at the meeting of March 26, 1903, the "Proceedings" contains all of the addresses and papers delivered at the Society's then frequent meetings, which the Publications Committee judged to be worthy of preservation. The "Proceedings" at first appeared at irregular intervals—later, four times a year.

In October, 1902, Dr. B. E. Fernow, then Director of the first school of forestry at Cornell, began the publication of the "Forestry Quarterly" which he continued until 1917. The first issue contained the following announcement of editorial policy:

"Although there are a number of publications in the United States and Canada, wholly or in part devoted to the propagandism of forestry, there are at the present time none which are mainly or entirely devoted to the professional or technical interests of the subject.

"With the establishment, within the last four years, of two fully-equipped special schools of forestry, whose graduates have begun work in the field; with the rapid expansion of the field work of the Federal Forestry Bureau, and of other agencies in technical direction, professional foresters have multiplied, and the time for means of communication among those who are building up the science and art of forestry in the United States seems to have arrived.

"The *Forestry Quarterly* is intended to meet this need.

"Besides publishing original articles on subjects of interest to the profession, and translations of such articles from foreign sources, it is intended to bring reviews and references to the current literature, and also, in brief notes, the notes, the news of the forestry world, personal and otherwise, with a view of keeping the readers in touch with the development of their art in all its branches.

"While this journal, in its inception and management, is a child of the New York State College of Forestry, it is hoped that, as time passes on, its pages may be used by all or any workers in the field for the discussion of their problems and record of their experiences.

"The *Forestry Quarterly* opens its pages for the freest discussion of all forestry problems; it welcomes advice and invites criticism which may tend to promote our professional knowledge."

In 1917 the "Quarterly" and the "Pro-

ceedings" were merged into the "Journal of Forestry" which since then has been the Society's official publication. In the first issue (January, 1917) the editorial policy was defined as follows:

"With this issue the JOURNAL OF FORESTRY takes the place of the Proceedings of the Society of American Foresters and of the Forestry Quarterly. . . . The new Journal is not an absorption of the Forestry Quarterly by the Proceedings or of the Proceedings by the Forestry Quarterly, but is in the true sense an amalgamation of the best features of the two original publications."

"The Journal will be devoted to all branches of forestry and will contain original articles, notes and comments, reviews of books, periodical literature, and news and personal notes. . . . It will be the official organ of the Society, and will be distributed to the active members of the Society without charge. . . ."

"The Editors bespeak an active interest of all readers in making the JOURNAL a worthy organ of the Society and representative of the best thought of the profession by the contribution of articles and otherwise. The Editors will welcome any suggestions and criticism, intended to improve the publication, addressed to any member of the Board."

The JOURNAL has had five successive Editors-in-Chiefs, each supported by an editorial staff, varying in numbers from 6 to 8, viz., B. E. Fernow, January 1917 to February 1923; Raphael Zon, March 1923 to May 1928; S. T. Dana, October 1928 to May 1930; Emanuel Fritz, October 1930 to December 1932; and Franklin Reed, January 1933—.

To all practical intents, Zon was Editor-in-Chief for the Society for 23 years. He served on the Editorial Board of the "Proceedings" from its inception and later was its chief editor. During the same period he was Fernow's right hand assistant on the "Quarterly." During the five years that Fernow was Editor-in-Chief of the JOURNAL, Zon was Managing Editor. His resignation was at his own initiative, for a combination of reasons,[1] one of them being that his official duties no longer left him the necessary spare time.

To fill the vacancy the Council commandeered the services of Samuel T. Dana, a former President of the Society, who was then, as he is now, Dean of the School of Forestry and Conservation at Ann Arbor, Michigan. After two years of devoted effort, he too was forced to give up for the same reason.

His successor, Emanuel Fritz, met with the same difficulty. As a member of the faculty of the Division of Forestry at the University of California, he could no longer spare the time and energy which the editorial job demanded.

In accepting Fritz's resignation, at the annual meeting in December, 1932, the Council, directed the Executive Secretary, myself, to carry on as acting Editor-in-Chief through the May, 1933 issue. The purpose was to give the Council time carefully to canvass the whole field and to select the very best man available. At the end of six months the Council was still unable to put its finger on a man possessed of the desired qualifications and at the same time both able and willing to undertake the responsibility.

The Council was confronted with a condition, instead of a theory. The JOURNAL OF FORESTRY must go on whether it had the idealistically perfect Editor-in-Chief or not. The Society was under contract with its 2,700 or more members and subscribers to furnish them with 8

[1]See Zon's letter of resignation in the March, 1928, JOURNAL OF FORESTRY, pp. 410-412.

copies of the magazine annually and the next issue must be off the press the first of October. It must be made up and in the hands of the printer in less than two months and there was a vast amount of work to be done in the way of reviewing, editing, and accepting or rejecting articles that had been offered for publication and of soliciting additional contributions. Furthermore, plans for the subsequent issues must be initiated. The Council met the situation by authorizing the executive secretary to serve as Editor-in-Chief until the completion of the May 1934 issue, by which time, it was hoped, there would again be a breathing spell that would permit a definite decision.

After the May 1934 issue had come off the press, it was still impossible to sign up a separate Editor-in-Chief and the Council therefore approved President Chapman's recommendation to keep the Executive Secretary in office as Editor-in-Chief until next January, when the whole problem would be thoroughly threshed out in executive session of the Council at the Society's annual meeting.

As to the JOURNAL's editorial policy: The policies followed by my predecessors is a matter of historical record written into those issues of the JOURNAL which they edited and published. The current editorial policy can also be appraised partially by an appraisal of those issues of the JOURNAL for which I have been responsible and also by my own conception of what the editorial policy of the JOURNAL is, or should be.

The editorial announcements quoted from the "Forestry Quarterly," the "Proceedings" and the first issue of the JOURNAL OF FORESTRY are the nearest thing to anything I can find approaching an official pronouncement on editorial policy.

About all we have in the way of a present day written definition of JOURNAL policy is to be found in the Society's Articles of Incorporation, in the present Constitution which was adopted in 1928, and in certain by-laws based upon it from which the following quotations are made.

"Articles of Incorporation."

"The particular business and objects of the Society are to encourage a broad and constructive practice of forestry; to stimulate research and achievement in the science of forestry; and to advance the profession of forestry through co-operative thought and a spirit of solidarity among foresters."

"Constitution."

"*Article II—Object.*—The object of this Society shall be to advance the science, practice, and standards of forestry in America."

"*Article IX—Editorial Staff.*—The Editorial Staff shall consist of a Chairman, chosen by ballot of the Council, and eight (8) other members of the Society, who shall be recommended by the Chairman and appointed by the President. The Chairman shall be designated Editor-in-Chief. The Chairman and other members of the Editorial Staff shall serve for two years, or until their successors are appointed. The Staff shall have charge of the official publication of the Society and shall decide all matters related to its publication, subject to such conditions as may be imposed by the Council."

"*By-Law 64.*—The JOURNAL OF FORESTRY is designated as the official organ or publication of the Society, referred to in various sections of the Constitution, and publication in it shall constitute notice to the membership as required in Arts. IV, VIII, and X, and in the By-Laws. Programs of meetings and similar publications, although strictly official publications of the Society, are not intended to be subject to the Editorial Staff as provided in Art. IX."

Out of all this, combined with a con-

sideration of the precedents established by my predecessors and guided also by comments of other interested Society members, I have deduced and am attempting to follow, these fundamental principles of editorial policy:

1. The JOURNAL OF FORESTRY is the property of the whole Society and all of its members. Its editorial policy and its methods of management therefore should be such as meet with the approval of the largest possible majority of the membership. The JOURNAL is not the personal property of the Editor-in-Chief, to be run according to his own personal whims and idiosyncrasies, nor should its policies be dictated by any one small minority group or faction.

2. The Council is the Society's Board of Directors, elected by the membership to conduct its affairs. One of its important duties is to oversee the conduct of the Society's official publication, the JOURNAL OF FORESTRY. The Editor-in-Chief who is appointed by the Council, and the whole Editorial Staff should, therefore, be subordinate to the Council.

3. The JOURNAL is the profession's one best medium for free expression of opinion and interchange of ideas, for the promulgation of new knowledge in all the various forestry fields and concerning all of the numerous and varied questions of forest policy and practice. The pages of the JOURNAL should, therefore, be freely open to any member who desires to express his independent thought and opinion. The only restrictions should be that he treat his subject in a manner that renders what he writes of instructive and constructive value; that his literary style be up to JOURNAL standards and that he avoid petty personalities.

4. The Society includes among its members foresters of wide variations in interest. Many of them are specialists and are interested primarily (and sometimes only), in articles on subjects coming within their respective fields. It is not humanly possible to publish a magazine every article in which would be of intimate interest to every member. About the best we can hope to do is to publish a combination of articles on varied subjects amongst which every reader, whatever his specialized interest, may find at least one that will be of value to him.

5. The Editor-in-Chief is not the sole arbitor of the JOURNAL. As the Constitution provides, he is the Chairman of an Editorial Staff composed of 8 Associate Editors. So far as it is humanly practicable, the responsibility for deciding what to publish should rest on the combined Editorial Staff.

In attempting to conduct the JOURNAL in compliance with the above principles, I have naturally in specific cases run up against difficulties such as anyone with editorial experience would understand. Certain branches of forestry have been inadequately covered in spite of earnest effort to solicit articles from foresters working within those fields. This applies particularly to several of the forestry activities under the New Deal. Beyond something good on the E.C.W., on forestry in the Indian Service, and on Article X of the Lumber Code (most of which I had to write myself) there has frankly been a paucity of New Deal material. The other New Deal forestry activities have not been touched, or at best, inadequately treated, for the simple reason that the foresters concerned have as yet been unable or unwilling to tell the JOURNAL's readers what their respective projects are all about. I have had no opportunity to reject any New Deal copy but on the contrary have had to run some that plainly was below par, for the simple reason that I could get nothing better. At one time I was hopeful of getting a ringing editorial, fully "in the spirit of the New Deal." The January,

1934, issue carried a signed editorial which some would characterize as being in the spirit of the "old deal." One of our most ardent New Deal members took strong exception to it and expressed a desire to answer it. I signed him up for the editorial page in the next issue. He failed me at the last moment. I am still hopeful that during the coming fall and winter months, after the New Deal has shaken down into more systematic and more smoothly running order, several of our members connected with it in high places will find the time to make contributions to the JOURNAL, so that its readers will be permitted to know what they are doing and how they are going about it.

As to the JOURNAL's editorials: Time was when they were all unsigned and were presumably accepted by our readers as the voice of the Society. Under Emanuel Fritz's regime the question was raised by the President and Council concerning the advisability of a certain such editorial. This lead to a discussion at the Council meeting in New Orleans in December, 1931, as to what the governing policy should be. It was agreed that all unsigned editorials should be accepted as the voice of the Society and should therefore be in line with the Society's officially adopted policy. It was also recognized, however, that there was room for signed editorials representing not necessarily the Society's policy and point of view, but primarily the point of view of the author himself for which he would be fully responsible. During my regime I have published several such signed editorials representing the author's personal point of view in the hope that they would stimulate constructive discussion of the points raised. My experience has been that our average reader refuses to make this distinction between a signed and unsigned editorial but persists in accepting every editorial whether signed or unsigned as the voice of the Society. My personal conclusion, therefore, is that all editorials should be in line with the Society's officially adopted policy and that if an individual member wishes to present a divergent point of view, what he has to say should appear in the JOURNAL not as an editorial but as an article over his signature in the body of the magazine.

After all is said and done, the proof of the pudding is in the eating and proof of the JOURNAL lies in the opinions of those who have been reading it carefully during the past several months. I can only insist that I myself as Editor-in-Chief and all of the 8 members of the Editorial Staff have been conscientiously doing our best to put forth a magazine that would come as nearly as possible to pleasing the greatest possible majority of its readers. Constructive suggestions how to make the magazine better have always been most welcome and have been earnestly solicited. Many members have given the editorial staff the benefit of their counsel. The 12 signers of the petition of June 13, are not among them.

At this point I might perhaps be permitted to express my own views on the existing scheme of organization wherein the position of Editor-in-Chief and Executive Secretary are combined in one man. When I first heard of the proposition two years ago, I was definitely opposed to it on the ground that it was inefficient organization. I felt that the two jobs are quite radically different in their nature and should normally be filled by individuals of marked difference in background, talent and temperment; an excellent Editor would not necessarily be a good Executive Secretary and vice versa; a man with the required editorial temperament and talent would be inclined to belittle and neglect the secretarial functions and by the same token an excellent executive secretary might give the editorial work the short end of the stick. It

was proving difficult enough to find a competent editor; it would be ten times as difficult to find a man possessed of both the editorial and the secretarial qualifications. Furthermore, it impressed me that the Editor-in-Chief, whoever he may be, and whatever he may do or may not do, is bound to draw down on his devoted head the wrath and condemnation of some individual member or some group of members for having rejected some manuscript or even for having insisted on publishing it. The Editor-in-Chief, therefore, as I sense it, should be as free from such influences as possible and should if at all possible not be a salaried employee of the Society.

By the summer of 1933 after I had had experience as Acting Editor and also had heard much argument in support of the combination, I found myself frankly "on the fence" and curious to see the scheme given a thoroughly practical test. It is in that spirit, therefore, that I have carried out the assignment as Editor-in-Chief for the period ending with the May, 1934, issue. With that experience behind me I find myself still on the fence, with the arguments and evidence "pro" evenly balanced by the "cons." If space would permit I could present a long bill of particulars listing numerous instances wherein the combination is of proven advantage to both functions and giving an equally long list of disadvantages. Such a brief however would be so long that too few would read it.

In the meantime it occurs to me that a compromise might be effected between the two schools of thought which might prove mutually satisfactory.

The time required to perform the strictly editorial functions, in my judgment and experience, is far less than most members unfamiliar with the internal workings of the Society's executive organization generally believe. In the days when Raphael Zon was Editor, he had to handle the whole works. He had to be editor, publisher, business manager, advertising manager, deal with the printer, read proof and do everything incidental to publication and distribution of the magazine. The Executive Staff of the Society has since the last two years reached that point of development and efficiency that it can relieve the Editor-in-Chief of all of the routine mechanical details of seeing the magazine through the press so that an Editor-in-Chief today could limit his time and efforts exclusively to the purely editorial function of deciding what material to publish and of providing the editorials.

It has been my opinion for some time that an Editor who is willing to follow that course and to unload on the Executive Office every last bit of routine work would find that the strictly editorial duties would not absorb more than 32 to 40 hours a month. Under this conception it might still be possible to find someone with the required qualifications to function as Editor-in-Chief as a side issue to his regular official duties. Maybe before another year is out, the Council will be able to put its mark upon such a man. He should, of course, be located within easy reach of the Executive Office so that he could maintain close and frequent contact with the Executive Secretary.

FRANKLIN REED,
Editor-in-chief.

Principles of Forest Policy for the United States

The Society's officially adopted forest policy, referred to in the foregoing exposition of the Journal's editorial policy, is embodied in these "Principles of Forest Policy." They were adopted by referendum vote in May, 1931, after three years of careful preparation by a specially appointed committee. Each section was voted on individually. The way the vote went is given after each section. Since then they have served as a guide to the Council in its conduct of Society affairs, including the editorial policy of the Journal.

It is now October, 1934. During the intervening three and a half years there has been marked, in some instances radical, evolution in professional forestry thought which undoubtedly, should be reflected in a revision of our official policy statement. In this every member can aid materially by giving the Council the benefit of his suggestions wherein and how our present policy principles can be modernized.—Franklin Reed, *Editor-in-Chief.*

I. Public Participation in Forestry

The industrial and general welfare of the country requires a direct participation of the public in the protection, development, and continuance of the forests.

Yes—824 No—12 No vote—3

II. Strengthening Public Forest Policies

To prevent further extensive deforestation, existing public forest policies must be strengthened or new policies created. Federal and state action are both required, and the federal government must not only discharge its own direct responsibilities, but must stimulate and coordinate state action.

Yes—816 No—15 No vote—8

III. Private Participation in Forestry

There rests upon private owners an obligation to handle their forests in such a manner as to prevent the public injuries which follow destructive exploitation and failure in fire protection.

Yes—745 No—77 No vote 17

IV. Public Assistance to Private Forestry

The public interest requires that private forests be protected from destruction. The public must therefore take the lead in offering every legitimate encouragement and assistance to private owners in removing controllable obstacles to private forestry.

Yes—822 No—12 No vote—5

1. Fire Control

The nature of the forest fire problem and the public interest in forest protection justify and demand that the federal and state governments provide adequate funds, far larger than at present, to enable the states, in coöperation with private owners, to complete and intensify the coöperative fire protection system.

Yes—818 No—17 No vote—4

2. Control of Insect and Fungus Infestations

Public funds must be provided in adequate amounts to control infestations of destructive insects and fungi, and to prevent, so far as possible, the occurrence of such infestations.

Yes—806 No—28 No vote—5

3. Reforestation

Congress and the state legislatures should provide liberal appropriations to aid in replanting private lands, and to replant denuded lands in the public forests.

Yes—709 No—113 No vote—17

4. Stabilization of the Forest Industries

The Government should protect the interest of the public against the losses sustained both by the public and the forest industries through over-production and wasteful exploitation of forests.

Yes—637 No—87 No vote—15

5. Coöperation to Improve Exploitation Practices

Coöperation between the federal government, the states, and the private owners in bringing about improved exploitation methods so as to eliminate destructive cutting is necessary for the perpetuation of our forest resources.

Yes—801 No—29 No vote—9

6. Taxation

Present forest taxation is an obstacle to private forestry. The states should establish forest tax systems adapted to the peculiar needs of the forest enterprise as a business with irregular and sometimes long-deferred income, fitting these systems to such reforms in public finance as may seem necessary to economical administration of local government in forest regions.

Yes—818 No—14 No vote—7

7. Research

The urgent need for larger scientific and economic knowledge of forests, domestic and foreign, and of their products, demands a greatly increased support, especially by the federal government, of the agencies engaged in forest research and experimentation.

Yes—791 No—36 No vote—12

8. Extension

The importance of educational work in forestry justifies and requires liberal appropriations by Congress and the state legislatures for the public agencies engaged in that work.

Yes—791 No—41 No vote—7

V. PUBLIC FORESTS

The manifold public and private interests in forestry require a greatly enlarged system of public forests, owned by the federal, state and local governments, occupying lands which require a special type of management difficult to secure under private ownership, and well distributed throughout the country.

Yes—788 No—37 No vote—14

1. Federal Forests

The federal government should acquire as large a proportion as possible of the forests needed to protect the watersheds of navigable or interstate streams and which are beyond the power of the states to acquire and properly handle, or which are not likely to be managed by private owners in a way to safeguard public interests.

Yes—806 No—25 No vote—8

The federal government should assist in the solution of the rehabilitation and submarginal land problems in several ways:

(a) by creating demonstration forests to show private owners good forest practices:

Yes—749 No—73 No vote—17

(b) by purchasing such lands for national forests in order to protect and manage the young growth, to reforest waste lands, and to withdraw submarginal farm land from cultivation:

Yes—728 No—96 No vote—15

(c) Unreserved forested lands of the public domain suitable for the purpose should be added to the national forests. Private forest lands intermingled with or adjacent to the national forests should be acquired by the government where best suited for that purpose.

Yes—807 No—20 No vote—12

2. State Forests

The states should establish public forests where essential to protect state interests in water conservation, in prevention of erosion, in the protection of areas of special scenic, historic and scientific value, and to promote public recreation, the conservation of wild life, the demonstration of applied forestry, coöperation with private owners in fire protection and coöperative marketing, and the utilization of land of low productive value.

Yes—820 No—10 No vote—9

3. County and Municipal Forests

County and municipal forests are an important feature of a general system of public forests, and should be encouraged where the local public interests will be served by their establishment.

Yes—767 No—58 No vote—14

4. Federal and State Collaboration

As a means of formulating an adequate program of public forests, the federal and state governments should collaborate in making a nation-wide study of needed public forests and of a fair division of federal, state, and local responsibility in their acquisition.

Yes—812 No—18 No vote—9

VI. PROTECTION FOREST ZONES

The public, in protecting water resources, should include private forests which are needed for watershed protection in a special category of protection forests subject to such regulatory measures as the public interest requires, and on these forests the public should bear a larger share of protection costs and road building than on areas where less onerous regulatory measures are needed. Where the protection of navigable streams, or of other national interests within federal constitutional powers, are involved, the responsibility for the creation of protection forest zones rests upon the federal government.

Yes—788 No—40 No vote—11

VII. DEVELOPMENT OF PUBLIC FORESTS

Federal and state financial support of public forests should be progressively increased to the point of fully developing their productive capacity.

Yes—788 No—37 No vote—14

VIII. PUBLIC CONTROL OF PRIVATE FOREST EXPLOITATION

1. The public has the responsibility to exercise such control over the exploitation of private forests as may be necessary to prevent injury to the community at large.

Yes—708 No—108 No vote—23

2. Any system of public control of private forests should provide:

(a) Control measures shall as far as possible be worked out by local and regional boards, in order to establish local representation.

Yes—737 No—57 No vote—45

(b) Forest owners shall be represented on these boards.

Yes—746 No—46 No vote—47

(c) Beyond a general restriction against clear cutting, without satisfactory provision for restocking, there shall be a minimum of prescriptive rules and a maximum of freedom on the part of the owner to work out his own methods to assure reproduction.

Yes—710 No—76 No vote—53

(d) Control measures shall give full weight to economic conditions and handicaps, and shall be applied reasonably and progressively, beginning with practices most easily susceptible of remedy and with remedies that are least onerous or most advantageous to the owner.

Yes—740 No—49 No vote—50

IX. FEDERAL RESPONSIBILITY IN PUBLIC CONTROL

1. The executive branch of the federal government should be authorized and instructed by Congress:

(a) to coöperate financially and in an advisory way with the several states in devising and carrying out regulatory measures, when and as needed, and in accordance with their respective constitutions and local needs:

Yes—749 No—66 No vote—24

(b) to encourage and assist groups of states with similar forest problems to adopt state compacts on regulations, subject to approval by Congress, as provided in the Constitution.

Yes—745 No—62 No vote—32

2. These various responsibilities of the federal government to bring about public control should be carried out.

<table>
<tr><td rowspan="2">Vote for one only</td><td>(a) through the Forest Service.
Yes—446 No—30 No vote—35</td></tr>
<tr><td>or (b) through a permanent central forestry board, supplemented by such regional and local boards as it should find necessary.
Yes—345 No—31 No vote—35</td></tr>
</table>

Total number of ballots cast—839.

By-Law No. 57

The following by-law was recently adopted by the Council:

By-Law No. 57. The funds of the Society except those needed for current use shall be deposited in a mutual savings bank approved by the Finance Committee, and/or invested in federal securities. No other class of securities shall be authorized as investments for Society funds. This by-law shall not be retroactive as ordering the sale of existing securities and reinvestment, except in the discretion of the Finance Committee.

Announcement of Candidates for Membership

The following names of candidates for membership are referred to Junior Members, Senior Members and Fellows for comment or protest. The list includes all nominations received since the publication of the list in the August Supplement, without question as to eligibility. The names have not been passed upon by the Council. Important information regarding the qualifications of any candidate, which will enable the Council to take final action with a knowledge of essential facts, should be submitted to the undersigned before November 1, 1934. Statements on different men should be submitted on different sheets. Communications relating to candidates are considered by the Council as strictly confidential.

FOR ELECTION TO GRADE OF JUNIOR MEMBERSHIP

Name and Education	*Title and Address*	*Proposed by Section*
Albert, Otis W. Colo. Agric., B.S.F., 1933.	Foreman, Tenn. State Forest Service, Kingsport, Tenn.	Appalachian
Bigley, Michael Univ. of Wash., B.S.F., 1933.	Jr. Technician, Ouachita Natl. Forest, Hot Springs, Ark.	Ozark
Blackerby, J. Harton Colo. Agric., B.S.F., 1933.	Foreman, C.C.C. Camp, Morristown, Tenn.	Appalachian
Cooper, Edward N. Univ. of Ga., B.S.F., 1934.	Cultural Foreman, Nantahala Natl. Forest, Franklin, N. C.	Appalachian
Fletcher, Peter Whitcomb Pa. State, B.S.F., 1933; Yale, M.F., 1934.	Junior Forester, U. S. F. S., Rolla, Missouri.	Ozark
Hamlin, Edgar G. Mich. State, B.S.F., 1916.	Forester, Whitney Realty Company, Sabattis, N. Y.	New York
Jacobson, Albin George Univ. of Mich., B.S.F., 1930; M.S.F., 1930.	District Supervisor, Dept. of Conservation, Newberry, Mich.	Ohio Valley
Kline, L. V. N. Y. State, B.S.F., 1928 (Reinstatement).	U. S. Forest Service, C.C.C., Edinburg, Va.	Allegheny
Kuppe, Adolph Joseph Willis Pa. State, B.S.F., 1925.	Supt. E.C.W., Camp S-52, Grantsville, Md.	Allegheny
Maturen, H. F. Univ. of Minn., B.S.F., 1924.	Technical Forester, Wis. Conservation Dept., Rhinelander, Wis.	Wisconsin
Randall, Arthur G. Yale, B.S., 1933; M.F., 1934.	Asst. to Technician, Allegheny Forest Experiment Station, Kane, Pa.	Allegheny

Riley, Madison Monroe N. C. State, B.S.F., 1933.	Technician, Appalachian Forest Experiment Station, Asheville, N. C.	Appalachian
Simmons, Edward M. N. Y. State, B.S.F., 1924.	Jr. Forester, Allegheny Forest Exp. Station, Philadelphia, Pa.	Allegheny
Syverson, Martin Louis Wash. State, B.S., 1933.	Jr. Forester, Ouachita N. F., Hot Springs, Ark.	Ozark
White, Jack C. Univ. of Mont., B.S.F., 1929 to 1933.	Technical Foreman, E.C.W., McComb Lake Camp, Munising, Mich.	Wisconsin

C. F. Korstian,
Member of Council in charge of Admissions.

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As recently reorganized by the President and Council.

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Paul G. Redington

PUBLIC FOREST POLICY

Ralph Hosmer, *Chairman*
H. L. Baker
Geo. Cecil
Robert Marshall
W. B. Greeley
Paul Herbert
J. P. Kinney
C. F. Evans

INTERNATIONAL RELATIONS

Ralph Hosmer, *Chairman*
N. C. Brown
R. S. Kellogg
E. N. Munns
A. C. Ringland
J. P. Kinney
R. C. Bryant
J. D. Guthrie
G. S. Perry
Barrington Moore
Ward Shepard
W. N. Sparhawk

PROFESSIONAL ETHICS

John D. Guthrie

REVISION OF CONSTITUTION

H. H. Chapman, *Chairman*
S. N. Spring
E. L. Demmon
E. Fritz
F. W. Besley

CLASSIFICATION OF FOREST SCHOOL

H. H. Chapman, *Chairman*
C. F. Korstian
H. A. Winkenwerder
E. Fritz
S. N. Spring

FINANCE

H. H. Chapman, *Chairman*
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C. M. Granger

FOREST FIRE CONTROL

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H. A. Reynolds
G. Conzet
E. Kotok
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Fred Morrell
H. L. Baker

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A. L. Wackerman
C. Kuehn
C. B. Webster
L. Weyman
G. D. Marckworth

METHODS OF ELECTION

H. H. Chapman, *Chairman*
H. F. Round
D. S. Olson
T. T. Munger
W. N. Baker

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Aldo Leopold, *Chairman*
P. S. Lovejoy
C. E. Rachford
W. P. Taylor
R. T. King

FOREST INFLUENCES AND EROSION CONTROL

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C. L. Forsling
J. Kittredge
C. J. Kraebel
Dr. G. R. Hursch
C. G. Bates
E. N. Munns
G. H. Lentz
G. R. Phillips
Lyle Watts

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Dr. Henry Schmitz
A. B. Hastings
F. W. Besley
C. A. Gillett

PUBLIC CONTROL OF FOREST EXPLOITATION

H. S. Graves, *Chairman*
Shirley W. Allen
Swift Berry
S. J. Hall
W. L. Hall
S. B. Locke
C. K. McHarg
W. N. Sparhawk
J. B. Woods

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Vice-President, Earle H. Clapp, U. S. Forest Service, Washington, D. C.
Secretary-Treasurer, C. M. Granger, U. S. Forest Service, Washington, D. C.

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The Council consists of the above officers and the following members:

	Term expires
F. W. Besley	Dec. 31, 1937
Emanuel Fritz	Dec. 31, 1937
Ward Shepard	Dec. 31, 1937
S. N. Spring	Dec. 31, 1937
E. L. Demmon	Dec. 31, 1935
A. F. Hawes	Dec. 31, 1935
C. F. Korstian	Dec. 31, 1935
Hugo Winkenwerder	Dec. 31, 1935

Member in Charge of Admissions

C. F. Korstian

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Franklin W. Reed, *Executive Secretary*

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Appalachian

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Vice-Chairman, Alaska: Wellman Holbrook, U. S. Forest Service, Juneau, Alaska.

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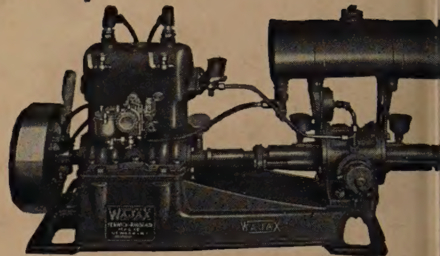

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